SCIENCE

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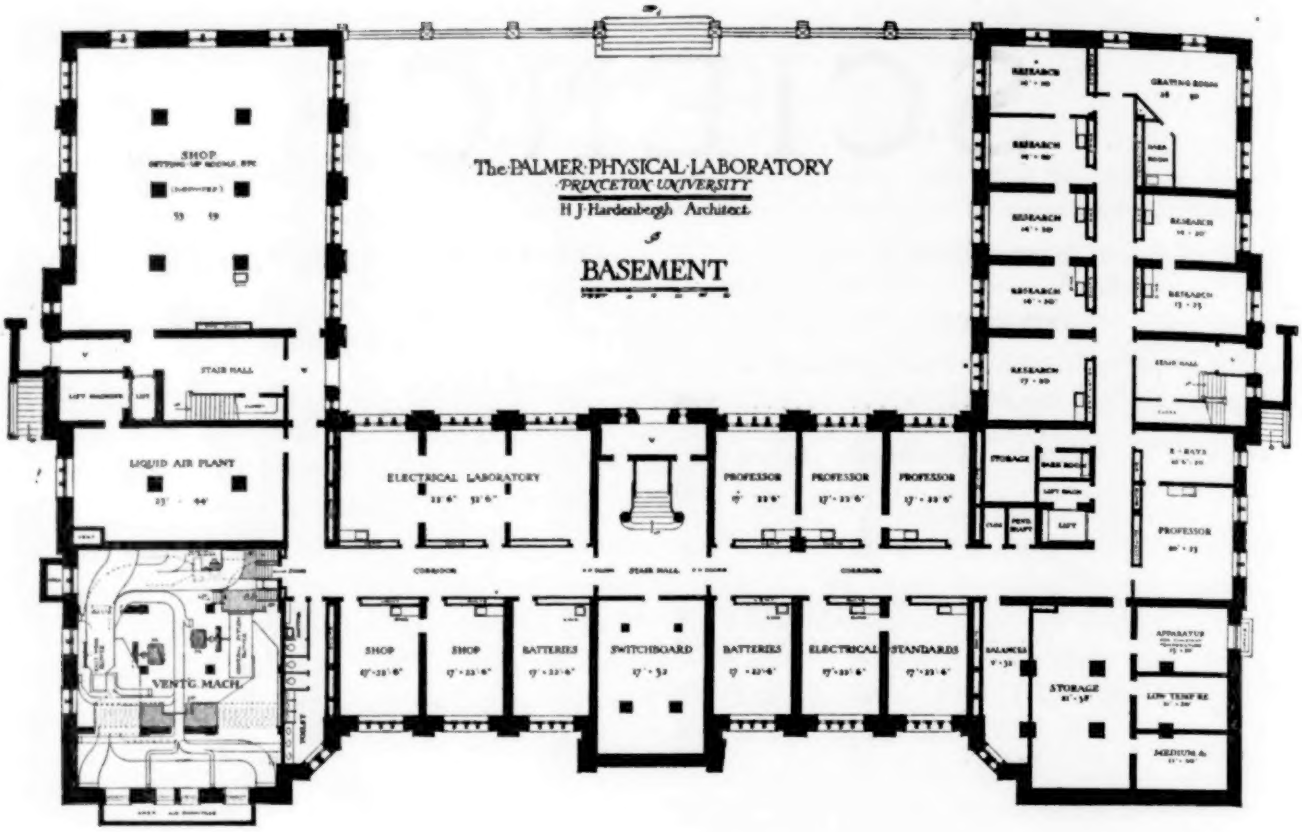
THE PALMER PHYSICAL LABORATORY

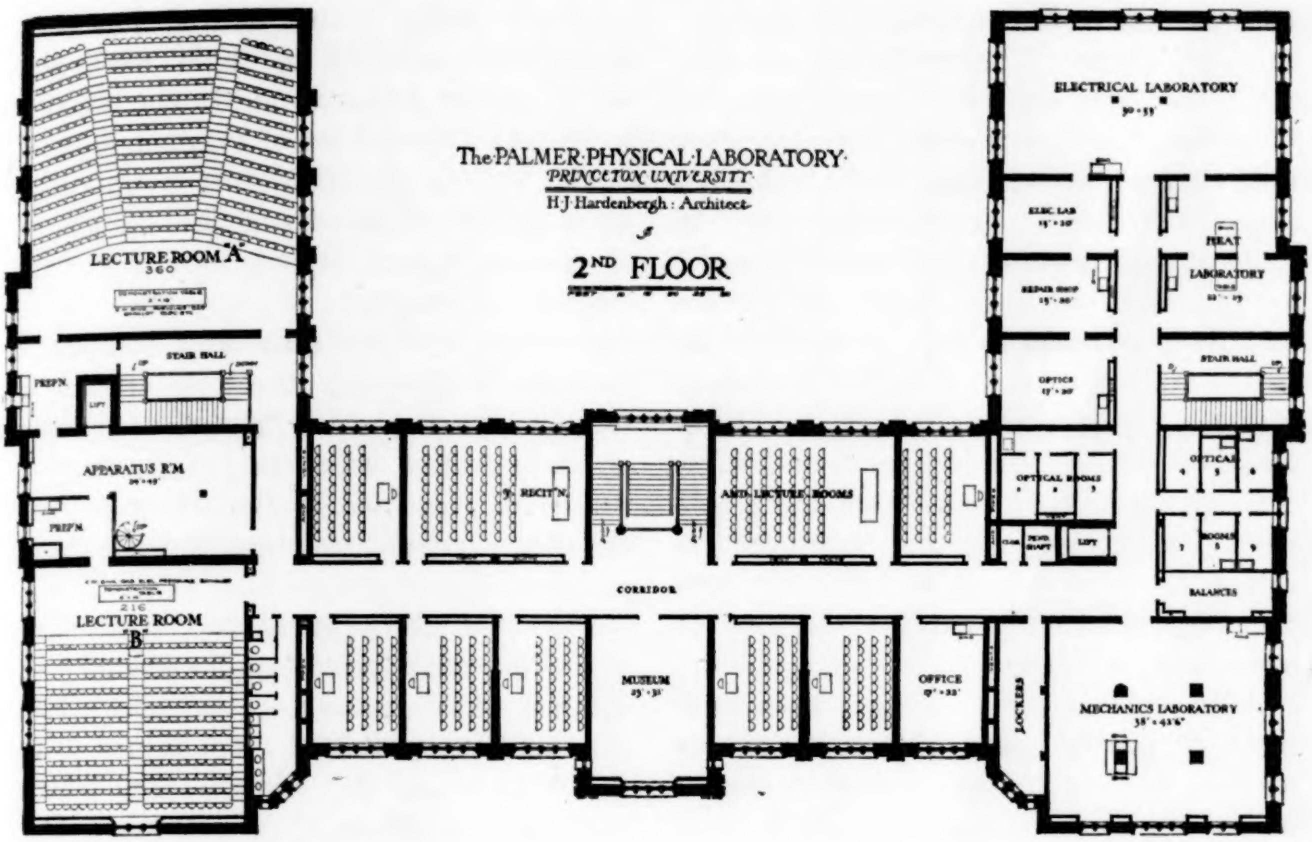
The Palmer Physical Laboratory of Princeton University was erected and equipped by the generosity of Stephen S. Palmer, Esq., of Princeton, to meet the rapidly growing needs of the departments of physics and electrical engineering. The building is devoted entirely to the uses of the two departments. It is a two-story and basement structure of brick and Indiana limestone, and is a striking addition to the group of collegiate Gothic buildings which have been added to Princeton's equipment in recent years. Mr. H. J. Hardenbergh, of New York, was the architect.

The laboratory is, roughly, H-shaped, with the tongue of the H shifted laterally towards the front. The location of the building and the contour of the land are peculiarly favorable for an abundant supply of air and light to all parts of the building. The land slopes away rapidly toward the south, so that while but two stories show in front, the wings and the back have three full stories above ground level. The constant temperature, electrical standards and ventilating rooms are almost wholly under ground; yet the machine shops, electrical laboratories and professors' and private research rooms, which occupy the balance of the basement, are entirely above ground.

A double problem had to be solved in the planning of the building—provision had to be made for the accommodation of the very large amount of work necessitated by the required courses in physics, both theoretical and experimental, and by the con-


The PALMER PHYSICAL LABORATORY
PRINCETON UNIVERSITY
H J Hardenbergh Architect
BASEMENT
SHOP
LIQUID AIR PLANT
VENT'G MACH.
ELECTRICAL LABORATORY
PROFESSOR
SHOP
BATTERIES
SWITCHBOARD
ELECTRICAL
STANDARDS
STORAGE
RESEARCH
PROFESSOR


The PALMER PHYSICAL LABORATORY
PRINCETON UNIVERSITY
H J Hardenbergh Architect
1ST FLOOR
FRESHMAN LABORATORY
STAIR HALL
LABORATORY
HONORS LABORATORY
DIRECTOR'S LAB.
DIRECTOR'S ROOM
PROFESSOR
LIBRARY
Colloquium
STAIRCASE HALL
STORES
RESEARCH APP
RESEARCH
CHEMICAL LAB.
ADVANCED LABORATORY



siderable number of elective courses in which experimental work is done. At the same time, rooms and equipment for the work of the students in electrical engineering and for the already large, and rapidly increasing, research work of the graduate students in physics had to be provided. The building may therefore be regarded as made up of two roughly equal portions. The upper floor and the east wing and other parts of the main floor are used mainly in undergraduate instruction. The basement and the balance of the main floor are given up to the rooms of the teaching staffs and of the advanced students. The facilities for the former include the following: four lecture rooms, one to seat 305, one to seat 176 and two with seats for 72 each; seven recitation rooms with 27 chairs each; and specially designed and equipped laboratories for the general courses, and for the special courses in the several branches of physics.

Twenty-eight research rooms have been equipped for members of the faculty and for other men carrying on experimental investigations. Constant temperature chambers, optical, photographic and photometric dark rooms, a balance room, a chemical laboratory, machine shops and an electrical standards room have been especially constructed and equipped for the use of any one carrying on work demanding such rooms and equipment.

The combined floor area of the three main stories is somewhat over 86,000 square feet. An additional area of 20,000 square feet in the attic is available, though not now utilized. This last space offers an unbroken stretch of 160 feet, and should prove invaluable for some types of experimental study.

The laboratory is a thoroughly fireproof structure and was planned to ensure the maximum of stability. It is of what may be termed the "wall-bearing" type as

distinguished from the modern steel "office building" type. The walls are of very heavy masonry and bear the full weight. The floors are constructed of steel girders and vitrified brick arches, overlaid with nearly a foot of concrete, and the roof is made of steel framing, half-baked tiles and heavy, graduated slate. Tests have shown that there is little, if any, more vibration on the main floor than there is on a heavy pier especially constructed in the basement, on the undisturbed earth and without contact with the floor. One and a half years' occupancy of the building has proven the total lack of need of anti-vibration supports for apparatus sensitive to mechanical disturbances.

Apparatus is installed for either complete or partial artificial ventilation, as may be desired. The ventilating system is broken up into four separate units. One cares for the ventilation of the east wing in which are the big lecture halls and the laboratories for the general courses in physics. The second provides for the west wing, in which are placed the advanced laboratories and most of the research rooms. The third suffices for the main part of the building in which are the small lecture halls, the recitation rooms, the library, some private rooms and the administrative offices of the departments. The fourth section is connected with the chemical laboratory, all dark rooms and the storage battery rooms. The exhaust air from the battery rooms is carried off in lead ducts. Thus far it has been found necessary to install fans and motors in only the first and the last of the four parts of the system. The general ventilation is a marked success.

The ordinary ventilating ducts of a few of the research rooms have been supplemented by other ducts arranged to provide for special drying of all the air admitted to those rooms. Any desired humidity may be maintained in those rooms by means of this device, to aid in electrostatic studies and other lines of original work.

The heating of the building is controlled by a system of thermostats which enable the temperature of any one room to be controlled independently of every other room. This feature of the structural equipment has proven its worth in certain studies of solutions, during which deleterious changes of concentration with changes of temperature were prevented by the ability to keep the room temperature constant, within very narrow limits.

The ventilating ducts and steam and water and other pipes are distributed in a manner which makes them at once accessible and yet protected from injury. All the walls along the corridors are hollow walls, with a fifteen inch interspace. Air ducts and all pipes are carried in a pipe tunnel, under the basement corridor floor. Risers pass from this tunnel to the wall interspace, and lead to the various rooms. The space in the walls is sufficient to permit a man to enter it to make repairs, without damage to the walls, as has been done. At the same time, this space offers an easy means of running special pipes, or lines, from one floor to another, and from room to room.

A pendulum shaft, running from basement floor to roof has been specially designed for the reception of a Foucault pendulum for showing the rotation of the earth. The pendulum is now in course of construction. Its ball is a lead sphere weighing nearly 1,300 pounds. It will be supported by a steel wire from crossed knife edges. It is hoped by this arrangement to ensure a continuous plane vibration of thirty-six hours or more.

The main machine shop is fully equipped and stocked for either the production of

the large amount of special apparatus required in research, or the repair of the even greater number of instruments broken in the general laboratory courses. Three machinists find themselves constantly busied in this work of production and repair.

Two smaller, fairly well equipped shops in different parts of the building are open to any one using the laboratory, for the rough repairs which often have to be made in an emergency.

The experimental equipment of the laboratory is most generous. In addition to the supply of the usual apparatus found in about all laboratories, the following, perhaps somewhat unusual, items of equipment have been installed and are in successful operation:

Refrigeration and Constant-temperature Rooms.—A four-ton ammonia refrigeration plant, driven by a ten-horse-power motor, provides for the cooling, or refrigeration, of two constant temperature rooms. These rooms, one 10 ft. $\times$ 10 ft. $\times$ 8 ft., the other 10 ft. $\times$ 20 ft. $\times$ 8 ft., are insulated by cork board of thickness sufficient to cut off practically all inflow of heat. On the test run these rooms were cooled simultaneously to $-7°$ F. and $+8°$ F., respectively. By means of a specially devised electrical thermostat, the temperature of the larger room has been held at 32° F. for twenty-four hours, with a variation of but one-twentieth of a degree during that time. By the use of the apparatus installed, the temperature of these rooms may be kept constant at any value between the lowest attainable in the room and the outside atmospheric temperature, the rooms being ventilated all the while.

Electrical Standards Room.—A room has been set apart and equipped for convenient and rapid comparison of the various electrical standards. Potentiometers, bridges and comparators are kept set up for use at any instant. The primary electrical standards of the laboratory are reserved exclusively for use in this room. It is provided also with a Callender recorder which can be connected by a special signal circuit to any room in the building, for registration of temperature or measurement of resistances.

Liquid Air Plant.—In the main machinery room, a two and a half liter liquid air plant, with Hampson liquefier and Whitehead compresser, is driven by belt from the motor of the main motor-generator set.

Pressure and Vacuum Systems.—Two systems of piping run from this main machinery room to all parts of the building, for supplying compressed air or vacuum as needed. To one system is connected an automatically controlled, motor-driven pressure pump, capable of producing a pressure of 100 lbs. per sq. in. By mere shifting of the stops on the controller, any pressure between that of the atmosphere and 100 lbs. per sq. in., with a variation of about one unit, can be supplied at any time, to any room where needed.

To the other system of piping a vacuum pump is coupled, which can produce a pressure of one half millimeter of mercury. This pump is not automatically controlled but can be started at any time by the throwing of a switch. By this machine a vacuum of the value named may be obtained in three or four minutes in almost any part of the laboratory.

But the most distinctive experimental feature of the laboratory is its electrical equipment. This is, the writer believes, unique in magnitude, and in the flexibility of the means of distribution of currents under widely different voltages.

Energy is received by means of 2-phase alternating currents from the central

power plant of the university. These currents are utilized for lighting or for power, or are transformed by motor-generator sets into direct currents for battery charging and for any other work requiring direct currents.

The storage battery equipment consists of four batteries of 60 cells each, two having a capacity of 320 ampere hours each, and the other two a capacity of 120 ampere hours each. One of the two larger batteries is connected permanently in series. It is the general working battery and carries the direct-current load of the building. The other of the larger batteries is broken up into 12-volt units, 6 cells in series. These 12-volt sets may be joined in series, or in parallel, or in any series-parallel grouping.

The individual cells of the two smaller batteries, called the research batteries, are connected separately to the switchboard. They may all be thrown into series, into parallel or into any series-parallel arrangement. This arrangement of batteries permits one to obtain, for example, 2 volts with a current capacity of 7,200 amperes, or 12 volts with a current capacity of 2,800 amperes, or 660 volts with a current of 60 amperes. Any other values of voltage and current between these limiting values, may be obtained.

All currents are distributed from the main switchboard. At least four conductors run from this board to each room separately, to insure to that room electrical service free from variation of voltage and free from interruption. While, of course, the very heavy currents mentioned above may not be transmitted by the general wiring of the system, any of the voltages indicated can be made available in any research room, lecture room or laboratory, with current up to 50 amperes.

Alternating currents in one- or two-phase and at a voltage of 110, 220, 1,100 or 2,200 volts can be supplied as desired, and by the interconnection of the phase changers of the department of electrical engineering, polyphase currents of different epochs and voltages can be thrown upon any line.

An automatic telephone system with sixteen instruments connects the various central points of the building. And an interconnecting signal system renders it possible to establish, by a few contacts on, at most, two panels, private lines between one room and any other four rooms in the laboratory. These circuits are suited for low voltages only, but have been of the greatest convenience in providing connections for the Callender recorder, for time signaling and for private signal systems.

The motor load amounts to somewhat more than 85 horse-power. This equipment is required for ventilation, elevators, pumps, compressors and the running of the machine shops.

The following equipment of a research room is typical of all. In addition to the general means for lighting, heating and ventilating, water, compressed air, vacuum, seven gas outlets, four wall plugs supplying 110 volts direct current and four supplying 110 volts alternating currents are installed. The special experimental circuits just mentioned above run from the main switchboard to each room, and the special signal circuits come into each room. Finally, a special lighting circuit is run in a wooden moulding on the ceiling, 18 inches from the side walls, to enable a lamp and cord to be dropped at any point over the wall tables for the illumination of galvanometers, telescopes and similar apparatus.

The working libraries of the two departments are installed in a large room on the main floor. The scientific library of

Professor C. F. Brackett, for thirty-five years head of the department of physics and originator of the graduate department of electrical engineering, has been presented to the departments and forms the nucleus for their libraries. These are supplemented by any desired work on engineering or physics from the general library of the university. Three book funds are available for purchase of books and of periodicals for the Palmer Laboratory Library.

A notable feature of the exterior of the building is found in the two statues in marble of Benjamin Franklin and Professor Joseph Henry, and a portrait relief of Professor Brackett. These were executed under the supervision of Mr. Daniel C. French. The statues show Franklin in familiar colonial garb and Professor Henry in academic robe. The statues and the relief are most successful.

Through the generosity of Messrs. David B. Jones and Thomas D. Jones, of Chicago, loyal graduates of the university, a fund of $200,000 has been provided for endowment. The income of this fund, according to the terms of the deed of gift, may not be used for salaries for teachers, for janitor's services, for repairs or up-keep of the building, or for heat, light, gas, water or power. It may be used for the payment of scientific helpers and research assistants, for the purchase of apparatus and supplies, for accessions to the libraries, and for the satisfaction of the general scientific needs of the two departments of the university for which the Palmer Laboratory was erected.

HOWARD MCCLENAHAN

PRACTICAL NOMENCLATURE

SHOULD general acquiescence in the decisions of the Nomenclatural Commission of the International Zoological Congress bring about that stability of names for which we have been striving, to what shall we have attained when that goal has been reached? What, in view of past results and present methods, will our system of names be like? Will it be the simple comprehensible binomial system that Linnæus devised? Alas, no. It will be a vast jungle of names, through which no one can see more than a few paces from his own door. No one can comprehend it; no one thinks of trying to master it; it baffles and hinders and masters us.

Synonymy is far from being the greatest of our nomenclatural troubles. Let any one who doubts this examine the Great Book of Names, which now surpasses the unabridged dictionary, without a definition in it. Let him remember that this Great Book is reserved for the names of genera only, other names not being included in it. Let him, in the group that he knows best, compare the lists of genera that have been described from decade to decade, noting the ever-accelerated rate of increase, and let him think what future editions of the Great Book will be like. Then let him note how few names in the group—in any group—are called into question, and he will realize how little the burden of terminology would be lightened were these few names all adjusted to his complete satisfaction. Synonymy is but the last straw that, added to the appalling load, threatens to break the camel's back.

To be sure, we have added this last straw right boldly. We have made rules, and by them we have all but firmly established and made permanent the following wholly unnecessary evils:

1. We have adopted the mistakes in name construction made by ignorant or careless systematists as a permanent part of our biological literature, which all of us must continue to repeat.

2. We have committed ourselves, likewise, to all sorts of egregious blunders, in cases where names were inappropriately, mistakenly or malevolently assigned.

3. We have accepted the elimination or al-

teration[1] of hundreds of well-known names that are root-names of many more genera within their respective groups: and such derived names, once of great assistance to the memory, have, so to speak, the props knocked from under them.

4. Finally, and most lamentably of all, by our hasty and profitless abandonment of even the best-known family names we have broken with our best traditions and have thrown our biological literature out of joint.

The pursuit of stability through rules of priority that has led to all this is surely one of the most singular of contemporary psychological phenomena. Codes of rules, interpreted by anybody and enforced by nobody have not been able to command the united support of public opinion among us, and we have at last begun to refer our disputes to the international commission for final adjudication. And we seem to be getting results—of the sort hitherto aimed at: *i. e.*, progress in the application of the law of priority. And some of us are beginning to wonder why this commission, if capable of disposing of small matters acceptably, might not have been entrusted with larger ones. Why should it determine merely whether a certain forgotten name, abandoned by its author and never used, is really eligible for use under the rules of the code? It grieves me to see fifteen big brainy men, capable of doing something ratonal, put into a hole where they are expected to do only such little sinful things as this.

[1] A curious case comes to hand in van der Weele's recent and excellent monograph of the Ascalaphidæ (Neuroptera). Van der Weele restores the original spelling Suhpalacsa, to a genus which Lefebure in 1842 created as an anagram out of the name Ascalaphus. (Kolbe made Phalascusa by like performance in 1897.) Hagen had in 1866 altered the name of Suphalasca, and in this form it had ever since been used. Now names of this sort are hard to remember at best: yet van der Weele creates two new names with the spelling he has just eliminated, leaving to future generations the task of learning for three closely allied genera the following: SUHPALACSA, SUPHALOMITUS, STEPHANOLASCA. Verily, "What has posterity done for us?"

The object of this article is not to criticize rules or codes, but to suggest an inquiry as to whether there is not a better way of disposing of our nomenclatural trouble than by making it as burdensome as possible and then making it permanent. Names are the handles by means of which we move all our intellectual luggage. The first requisites of handles are that they should be easy to grasp and easy to retain hold of. Our spade and axe and scissors handles are shaped to fit our hands: why should not our generic and family names be shaped to fit our brains? If they are for use, they must be so fitted. Granting that stability is speedily attainable with our present machinery, we have yet need to inquire whether we have fashioned the sort of a set of names that we should seek to perpetuate.

We have been too much taken up with codes, and have given far too little consideration to evils more fundamentally important. Our worst and most permanent difficulties are not due to synonymy, but to the enormous growth of systematic knowledge, and to the natural limitations of men's minds. They are such difficulties as attend vigorous growth in any human enterprise. Changed conditions create new needs.

Our binomial nomenclature is not that of Linnæus. In the first place it is not binomial; for, even when not dealing with varieties or races, we add to the names of genus and species the names of one or two authors, and thus make it tri- or quadri-nomial. In the second place, it is not simple and straightforward and serviceable as his was. The Linnæan system won its way because it was fit. It reduced the long descriptive Latin phrases previously used for designating species, to two words, only one of which, like a given name, had to be learned for each species. It provided a simple and consistent method for designating additional and unknown species as they should become known. Genera were few, and names were for the most part simple and significant. In a large part they were not new names, but were selected because of the past service they had rendered:

they were fitted to the mental mechanism of the race. Had they been *built*, as multisyllabic heterozygous names are now built, without regard to the limitations of the human mind, it is safe to say that no Linnæan system would ever have come down to us.

But the Linnæan system was better suited to Linnæus's day than to ours. It provided for the recording of progress in systematic knowledge only by means of a proportionate growth in terminology. It could remain simple only while the known organisms were comparatively few. It was inevitable that such a system of names, having no check to overgrowth, should, with the rapid progress in knowledge of the world's fauna and flora, sooner or later be in danger of falling of its own weight. It was inevitable that the new names proposed should grow ever more complex and difficult to handle. Specific names, although often without fitness or significance[2] have, for the most part, remained simple. The cumbersomeness of generic and family names is due in part to the codes, but in a far larger part to the growth of systematic knowledge. The supply of classic names was not adequate for Linnæus' use. And with the multiplication of genera it has been increasingly harder to find brief, simple names, and far easier to create them by transposing and compounding. Wherefore, let us not lament that the burden of terminology, in so far as it represents the increase of knowledge, has grown heavier, but let us rather seek for improved means of carrying it. Were it not better to spend a little less energy in establishing priority in a system that is old and cumbrous and overgrown, and a little more in adjusting that system to the conditions of the present and the future, making it more simple, more concise, or at least more manageable? Sometimes, when our clothing gets too heavy for comfort, we leave some of it off. May it not be that the organism we know as a zoological congress is sufficiently adaptable to conditions to rise and do likewise?

[2] In this Year of Grace 1910 Mr. N. Banks publishes (in *Psyche* for June) descriptions of six new species of Australian lacewing flies belonging in the genus *Chrysopa* under the following names:

C. olatatis, *C. latotalis*, *C. satilota*,
C. italotis, *C. atalotis*, *C. otalatis*.

These names are perfectly admissible under the rules, and are as good as any others under the interpretation that "A name is a name, and not a definition." But when students of the Australian fauna have dissociated and assimilated the six, they will doubtless remember Mr. Banks.

After long consideration of this matter, and with much hesitancy, I offer the suggestion that we adopt large groups, as comprehensive as the genera of Linnæus, or as the most modern subfamilies, and designate them by *fit* names, and that we designate subgenera, species and varieties by a simple combination of letters and figures: and that we enter these designations of the lesser groups after the group name in their numerical or alphabetic sequence, and in their historic order—the order in which the descriptions were published. I think I can show that with fewer names than Linnæus used and with designations for species that shall not exceed three places, we can handle comfortably all known forms of life and then go on unencumbered, describing and classifying to our hearts' content.

Let me illustrate the plan by a concrete example. The subfamily Lestinæ of Odonata is a homogeneous group of dragonflies, readily distinguishable by any one. The members of this group long reposed under the generic name *Lestes*, and it would be convenient for all of us if they were so named still. They now bear the names *Sympycna, Archilestes, Megalestes*, etc., and although any one might know and remember *Lestes*, no one but a specialist in the group could afford to remember all these. Under the system here proposed they would all again bear the name *Lestes* (as would all the additional members of the group that the future might bring to light). The species first described would be *Lestes 1;* the next described, *Lestes 2;* nothing more, provided they have not in the past been separated from *Lestes*. But in order to preserve fully the results of systematic progress, it is

proposed, not to throw away the new genera, but to designate them by capital letters; the first described (*Sympycna*) by A; the next described (*Megalestes*) by B; the third described (*Archilestes*) by C, etc. Then if the species we designate as *Lestes* 3 were subsequently placed under *Sympycna,* its full designation would be *Lestes* 3A. And if a new species were subsequently described as a species of *Sympycna,* its designation under our system would be *Lestes* A1. Thus two places would be sufficient for the designation of a species until the numbers described under a single name reach 10, and three, until they reach 100. And, moreover, these few places suffice to show two most important things: the subgroup under which the species was described, and the one in which it now reposes. Varietal designations could then be made, as frequently they are now made, by the addition of small letters a, b, c, etc., likewise in their historical order.

I have selected this illustration to avoid even the suspicion of unfairness. The subfamily Lestinæ is an example of our present system at its best. For our day and generation the names are unusually brief and significant. For the most part they are pronounceable, and nobody has "monkeyed" with them. Nobody has succeeded in finding a defunct name older than *Lestes* to be dug up and set up instead, to the confusion of the entire group. Synonyms are few and the validity of no generic name is in dispute. And it is safe to say that if things had gone as well elsewhere as in this group, there would not be our present agitation over codes and rules. But I wish to point out that, even so, there are great advantages to be derived from a simpler and more practical system. Therefore, I have set the group in the proposed systematic order in a subsequent column and opposite each species I have written the name it now bears.

Names Proposed	Explanatory Signs	Names Now in Use.	Year of Publication
Lestes 1		Lestes barbara Fabricius	1798
Lestes 2	*	Lestes sponsa van der Linden	1823
Lestes 3A	*	Sympycna fusca van der Linden	1823
Lestes 4		Lestes viridis van der Linden	1825
Lestes 5	=4	Lestes leucopsallis Charpentier	1825
Lestes 6	=2	Lestes forcipula Charpentier	1825
Lestes 7		Lestes virens Charpentier	1825
Lestes 8	=3A	Sympycna phallata Charpentier	1825
Lestes 9		Lestes macrostigma Eversmann	1836
Lestes 10		Lestes paedisca Evermann	1836
Lestes 11	=2	Lestes nympha Stephens	1836
Lestes 12	=2	Lestes picteti Fonscolombe	1838
Lestes 13		Lestes rectangularis Say	1839
Lestes 14		Lestes undulata Say	1839
Lestes 15		Lestes eurina Say	1839
Lestes 16		Lestes cingulata Burmeister	1839
Lestes 17		Lestes plagiata Burmeister	1839
Lestes 18		Lestes virgata Burmeister	1839
Lestes 19C	*	Archilestes grandis Rambur	1842
Lestes 20		Lestes tenuata Rambur	1842
Lestes 21		Lestes forcipata Rambur	1842
Lestes 22		Lestes forficula Rambur	1842
Lestes 23		Lestes pallida Rambur	1842
Lestes 24		Lestes analis Rambur	1842
Lestes 25D	*	Platylestes platystylus Rambur	1842
Lestes 26		Lestes colensolis White	1846
Lestes 27		Lestes spectrum Kolenati	1856
Lestes 28		Lestes alacris Hagen	1861
Lestes 29		Lestes stulta Hagen	1861
Lestes 30		Lestes congener Hagen	1861
Lestes 31		Lestes vidua Hagen	1861
Lestes 32		Lestes unguiculata Hagen	1861
Lestes 33		Lestes inequalis Walsh	1862
Lestes 34B	*	Megalestes major de Selys	1862
Lestes A1		Sympycna ochracea Montrose	1864
Lestes 35		Lestes smardulus Buchecher	1878
Lestes A2		Sympycna pædisca Brauer	1880
Lestes A3		Sympycna annulata de Selys	1887
Lestes 36		Lestes dryas Kirby	1890
Lestes E1	*	Ortholestes clara Calvert	1891
Lestes E2		Ortholestes abbotti Calvert	1893
Lestes 37		Lestes obscura Kirby	1894
Lestes F1	*	Orolestes selysi McLachlan	1895
Lestes C1		Archilestes californica McLachlan	1895
Lestes A3a		Sympycna annulata gobica Forster	1900
Lestes E3		Ortholestes octomaculata Martin	1902

This list,[3] besides furnishing concise designations for the species, shows at a glance the history of the development of our knowledge of the group. The species designations also are of such nature that when isolated they will carry much historical information with them: whether early or lately described, whether reposing now in early or lately proposed subdivisions of the group: under what name originally described. And the distribution of valid names and of synonyms among the subgenera is obvious at a glance. By adding a few conventional signs to the list I have sought to show that types may be indicated as well as at present by an asterisk, and synonyms by a sign of equality: and I might have used another sign to indicate that some species

[3] I have omitted about two score species of Lestes *s. str.* for want of room: all featureless for our present purpose. All synonyms and all the "problems" of the subfamily are included down to the point where my annotated copy of Kirby's "Catalogue of the Odonata" ends.

(nos. 1–12 and 16–18) were described under another generic name (*Agrion*) older than *Lestes*.

It seems to me obvious that this system will provide a convenient means of handling an indefinite increase of our systematic knowledge in the future, while at once and forever putting an end to the multiplication of the names that every one must use within the group.

Let the principal systematic workers in a large group select the names to be retained in that group—say, as many of them as there are subfamilies in the group, and let these names be selected on the basis of fitness.[4] The balance is automatic. Let the International Commission have the final word to say in case of differences of opinion as to names. Let the commission issue the lists as ready, and let each issue "spike the guns of priority." If a mistake be made in the historical order of some entry, no matter: let the entry stand; add if you must for the few occasions when it will be of any consequence some conventional sign to indicate that the order has been violated in this case. Then we will have stability.

There are, among other things, three points to be guarded in considering the change like that here proposed. Will it sacrifice the past? Will it impede the future? Will it be too troublesome or too costly to initiate? With regard to the first of these I believe that the selection of the fittest generic names will do more than anything else can do to preserve our best traditions. Thus we may be able to put back on duty again such names as *Corethra, Chironomus, Amphioxus* and a host of others that have been cast aside as lightly as though they had never filled leading rôles in zoological classics.

The elimination of specific names is a different matter. When they are such pleasing and companionable names as *Lestes psyche, L. io* and *L. leda* of de Selys, I admit I shall miss them. But there are more of them I should be glad to miss, because they are barbarisms or misfits and give offense, or because they are overburdensome to carry. But good and bad, I consider their elimination from a standard list of the world fauna inevitable, simply because the cost of retaining them for use everywhere has become excessive.

Generic names now answer fully nine tenths of our needs. We do not often use specific names except in the groups in which we are specialists—saving, of course, in the case of the more familiar species among the higher vertebrates; and here we have common names which have become of late our chief reliance.

Others have expressed the opinion that the names of the future will be fiat.[5] The application of the Dewey system of numbers to species was long ago proposed. I believe, however, that within normal endurance limits, names are better than numbers for designating things, quite aside from any traditional value they may possess: at least names are more natural to us. So, retaining a name for each group of such size as a biological layman may be supposed to need a name for, I have then proceeded to treat subgroups and species with designations that are in a small part fiat, and in a large part not so. Historical order is the essence of the method, and this is surely not fiat. And the designations proposed are not in fact so different from those to which we are by usage more accustomed. *E, F* and *G* appended to the old group name *Ephemera* would surely be more easy to handle than the three elongated numerals which Walsh left us for designating its subdivisions, *Pentagenia, Hexagenia* and *Heptagenia*. No one would think of protesting should I name three new species of any genus *quintus, sextus* and *septimus*.

These designations, although very brief, allow for the recording of every advance in systematic knowledge. Every new genus is retained and each species, forever recognizable by its specific designation, may be shifted

[4] Fitness, in my judgment, would consist in: First, familiarity through long usage. Why sacrifice the benefits that come from having brain paths well broken? Next, significance, euphony and brevity. Next, etymological correctness. Last and least, priority when dissociated from usage.

[5] See, for example, the article by Jonathan Dwight, Jr., in SCIENCE, N. S., 30, 527, for October 15, 1909.

about (by the use of the added letter) without losing identity.

How will this proposal affect future progress? It should lighten the "burden of nomenclature" for every one who is not born with unusual ability in dealing with names: it should facilitate the work of the morphologist, the ecologist, the physiologist, the comparative psychologist, the field naturalist and the layman. And while the demand for simplification of terminology has not arisen from among those who are most actively engaged in describing new forms, this proposal will interfere in no way with the work of the systematist. Let the grinding of new species go merrily on: it is desirable that the fauna of the whole world be made known. Let genera and species be described and named as now. Let them be named in anagrams or in dithyrambs. Let them bear the name of Mr. Wollingstone-Prendergast or of Satan: no matter: after the group name and serial number has been attached no one will be inconvenienced or offended. Let the splitter split and let the lumper lump: each species once entered under its proper designation, under that designation it will ever remain: only the appended letter is changed by later shifting to another position in the group.

For the inauguration of such a system the machinery is already provided in the International Commission, and the preliminary work has already been done. Owing to the long search for priority the dates of names have been determined already with great conscientiousness throughout nearly the whole field of biology.[6] It were better that zoological and botanical congresses should unite in this and that a complete standard name list for the fauna and flora of the world should be issued, giving the old names and their modern equivalents. Let additional designations be made (by the same commission: never by the describer, who merely names as now) in annual lists, such as are now announced in the *Zoological Record*. A few very recent species would thus have to be designated in the old way for a time. Let the international congresses in order to insure the success of the plan make one new rule: that new genera and species, to be valid must be issued in a publication which adopts and uses the standard list. Then we should have again a set of names fit for our general intellectual currency. No one who chose still to use all the subgeneric names would be restrained from so doing. Many in the present generation, inured to the long names, might prefer to go on using them all; but a new generation would regard them as we now regard the huge conchs and scraps of metal that were used for barter in primitive times.

JAMES G. NEEDHAM

[6] I was able with the aid of an annotated copy of Kirby's "Catalogue of the Odonata" to arrange a complete name list for the subfamily Lestinæ in about an hour. With two copies and a pair of shears, I think it might have been done in fifteen minutes.

THE NATIONAL CONSERVATION CONGRESS

THE program of the congress to be held at St. Paul next week includes the following addresses:

September 5—Morning: Addresses of welcome; an address by President Taft; "Our Public Land Laws," Senator Knute Nelson, of Minnesota. Afternoon: Conference of the governors of the states; addresses by governors.

September 6—Morning: Reports by the State Conservation Commissions; address, "National Efficiency," ex-President Roosevelt; appointment of committees. Afternoon: "Conservation—the Principle of the Red Cross," Miss Mabel Boardman, of Washington, president of the American Red Cross; "Safeguarding the Property of the People," Francis J. Heney, of California; "The Prevention of Power Monopoly," Herbert K. Smith, United States Commissioner of Corporations; "The Franchise as a Public Right," Herbert Hadley, Governor of Missouri; "Water as a Natural Resource," E. A. Fowler, of Phœnix, Ariz., president of the National Irrigation Congress; "The Development of Water Power in the Interest of the People," George C. Pardee, of Oakland, Cal.

Evening: Illustrated lecture, Big Game, Arthur Radclyffe Dugmore, New York.

September 7—Morning: "Rational Taxation of Resources," Dr. Francis L. McVey, president of the University of North Dakota; "The Interest of the Railways of the South in Conservation," W. W. Finley, president of the Southern Railway Company; "Laws That Should Be Passed," Francis G. Newlands, Senator from Nevada; "Making Our People Count," Dr. Edwin B. Craighead, president of Tulane University; "The Press and the People," D. Austin Latchaw, Kansas City *Star*. Afternoon: "Farm Conservation," James Wilson, Secretary of Agriculture; "Cattle, Food and Leather," Jonathan P. Dolliver, United States Senator from Iowa; "Conservation and Country Life," Professor Liberty Hyde Bailey, Cornell University; "Soils, Crops, Food and Clothing," James J. Hill, of St. Paul. Evening: Illustrated lecture, "Birds," Frank M. Chapman, curator, department of birds, New York City.

September 8—Morning: "Pan-American Conservation," John Barrett, Bureau of American Republics, Washington; "This Continent as a Home for our People," Dr. W J McGee, United States Department of Agriculture; "The Forest and the Nation," Henry S. Graves, United States Forester; "Life and Health as National Assets," Dr. F. F. Wesbrook, Minneapolis. Afternoon: "The Natural Resources Belong to the People," James R. Garfield, former Secretary of the Interior; "Are We Mining Intelligently?" Thomas L. Lewis, president of the United Mine Workers of America; "Education and Conservation," Dr. Elmer Ellsworth Brown, United States Commissioner of Education. Evening: Illustrated lecture, "Personal and National Thrift," B. N. Baker, president of the National Conservation Congress.

September 9—Morning: "Conservation True Patriotism," Mrs. Matthew T. Scott, president-general of the National Society, Daughters of the American Revolution; "Saving Our Boys and Girls," Judge Ben. B. Lindsey, Denver; "The Conservation Program," Gifford Pinchot, president of the National Conservation Association; reports of committees.

THE INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE

THE Second International Commission on Nomenclature was appointed in 1895 by the third International Zoological Congress, held at Leyden, Holland. It was directed to study the various codes of nomenclature and to report to a later congress. At the fourth (Cambridge, England) congress, 1898, the commission was made a permanent body, and increased to fifteen members, who later (at the Berne congress, 1904) were divided into three classes of five commissioners each, each class to serve nine years.

During the interval between the congresses, the commission has been in correspondence; it has held one meeting (1897) between congresses, and regular meetings during the triennial congresses. As a result of its labors, the original Paris-Moscow (1889, 1892, the Blanchard) code was taken as the basis, and with certain amendments was adopted (Berlin congress, 1901) by the International Congress. Amendments were presented by the commission to the Boston congress (1907) and were adopted.

The Berlin meeting (1901) adopted a rule that no amendment to the code should thereafter be presented to any congress for vote unless said amendment was in the hands of the commission at least one year prior to the meeting of the congress to which it was proposed to present the amendment.

Prior to the Boston congress a desire had developed among zoologists that the commission should serve as a court for the interpretation of the code, and in accordance therewith the commission presented to the Boston congress five opinions which were ratified by the congress.

Since the Boston meeting, a number of questions on nomenclature have been submitted to the commission for opinion. Owing to the amount of time consumed in communi-

cating with the fifteen commissioners, it was impossible to act promptly upon these cases, but in the winter of 1909–10 the Smithsonian Institution gave a grant to provide for the clerical work, and since that time it has been possible to render the opinions more promptly.

The commission has no legislative power. Its powers are restricted to studying questions of nomenclature, to reporting upon such questions to the International Congress and to rendering opinions upon cases submitted to it.

The Smithsonian Institution has now undertaken the publication of these opinions up to a certain point. Publication No. 1938 entitled "Opinions Rendered by the International Commission on Zoological Nomenclature," has just been issued and gives the first twenty-five opinions prepared by the commission.

The following is the method to be adopted in submitting cases for opinion, and zoologists will aid the commission in its work if they will bear in mind the following points:

1. The commission does not undertake to act as a bibliographic or nomenclatural bureau, but rather as an adviser in connection with the more difficult and disputed cases of nomenclature.

2. All cases submitted should be accompanied by (*a*) a concise statement of the point at issue; (*b*) the full arguments on both sides, in case a disputed point is involved, and (*c*) complete and exact bibliographic references to every book or article bearing on the point at issue. The more complete the data when the case is submitted, the more promptly can it be acted upon.

3. Of necessity, cases submitted with incomplete bibliographic references can not be studied, and must be returned by the commission to the sender.

4. Cases upon which an opinion is desired may be sent to any member of the commission.

5. In order that the work of the commission may be confined as much as possible to the more difficult and the disputed cases, it is urged that zoologists study the code and settle for themselves as many cases as possible.

THE BROOKS MEMORIAL VOLUME

THE ninth volume of the *Journal of Experimental Zoology* will be a memorial to William Keith Brooks prepared by his former students at the Johns Hopkins University. It will be issued in four numbers during the latter half of the present year and will contain 900 pages with numerous plates. The biographical sketch has been prepared by Professor H. V. Wilson and includes three heliotype portraits. The contents of the volume are as follows:

E. A. Andrews, Johns Hopkins University: "Conjugation in the Crayfish, *Cambarus affinus*."

Robert Payne Bigelow, Massachusetts Institute of Technology: "A Comparison of the Sense Organs in Medusæ of the Family Pelagidæ."

Hubert Lyman Clark, Harvard University: "The Development of an Apodous Holothurian (*Chiridota rotifera*)."

Edwin G. Conklin, Princeton University: "The Effects of Centrifugal Force upon the Organization and Development of the Eggs of Fresh-water Pulmonates."

R. P. Cowles, Johns Hopkins University: "Stimuli Produced by Light and by Contact with Solid Walls as Factors in the Behavior of Orphiuroids."

Otto C. Glaser, University of Michigan: "The Nematocysts of Æolids."

Seitaro Goto, Imperial University, Tokyo: "On Two Species of Hydractinia Living in Symbiosis with a Hermit Crab."

Charles Wilson Greene, University of Missouri: "An Experimental Determination of the Speed of Migration of Salmon in the Columbia River."

Ross Granville Harrison, Yale University: "The Outgrowth of the Nerve Fiber as a Mode of Protoplasmic Movement."

Francis H. Herrick, Adelbert College: "Life and Behavior of the Cuckoo."

H. S. Jennings, Johns Hopkins University: "What Conditions Induce Conjugation in Paramecium?"

Duncan S. Johnson, Johns Hopkins University: "Studies in the Development of the Piperaceæ."

George Lefevre and W. C. Curtis, University of Missouri: "Reproduction and Parasitism in the Unionidæ."

Edwin Linton, Washington and Jefferson College: "On a New Rhabdocœle Commensal with *Modiolus plicatulus*."

J. Playfair McMurrich, the University of Toronto: "The Genus *Arachnactis*."

S. O. Mast, Goucher College, Baltimore: "Reactions of Amœba to Light."

Maynard M. Metcalf, Oberlin College: "Studies on Amœba. I. On the Localization of the Excretory Function in *Amœba proteus*."

T. H. Morgan, Columbia University: "Studies on Eggs Subjected to Centrifugal Force."

Henry F. Nachtrieb, University of Minnesota: "The Primitive Pores of *Polyodon spathula* (Walbaum)."

Henry Leslie Osborn, Hamline University: "On the Structure of *Cryptogonimus* (nov. gen.) *chyli* (n. sp.) an Aberrant Distome, from Fishes of Michigan and New York."

G. C. Price, Leland Stanford Jr. University: "The Structure and Function of the Adult Head Kidney of *Bdellostoma stouti*."

A. M. Reese, West Virginia University: "The Lateral Line System of *Chimæra colliei*."

Samuel Rittenhouse, Olivet College: "The Embryology of *Stomotoca apicata*."

David H. Tennent, Bryn Mawr College: "Variation in Echinoid Plutei."

Albert H. Tuttle, University of Virginia: "Mitosis in *Œdogonium*."

Edmund B. Wilson, Columbia University: "Studies on Chromosomes."

H. V. Wilson, University of North Carolina: "A Study of Some Epithelioid Membranes in Monaxonid Sponges."

SCIENTIFIC NOTES AND NEWS

WILLIAM JAMES, emeritus professor of philosophy in Harvard University, died at his summer home at Chocorua, N. H., from heart disease on August 26, in his sixty-ninth year.

DR. SIGMUND EXNER will preside over the International Physiological Congress which meets at Vienna at the end of September.

PROFESSOR SCHULTZE, the eminent biological chemist of the Zurich School of Technology, has been made an honorary doctor of Heidelberg University, on the occasion of his seventieth birthday.

DR. EDMUND WEISS, professor of astronomy at Vienna, has celebrated the fiftieth anniversary of his doctorate.

DR. ALBERT EULENBERG, professor of neurology at Berlin, celebrated his seventieth birthday on August 10.

DR. A. E. KENNELLY, of Harvard University, and Mr. C. F. Scott represented the United States at the informal conference of the International Electrical Commission, held at Brussels in August.

AT the University of Washington, on June 14, an address before the Sigma Xi was given by Professor Alexander Smith, of the department of chemistry of the University of Chicago, his subject being "The Balance Sheet of Science." At the summer session of the same university Professor Smith gave a series of twelve lectures on the subject of "The Teaching of Chemistry."

DR. H. C. COOPER, associate professor of chemistry, Syracuse University, is delivering a course of twelve lectures on "Physico-Chemical Analysis" during the summer quarter of the University of Chicago.

THE inaugural address on the occasion of the opening of the winter session of the London School of Tropical Medicine will be delivered by Professor Miers, of the University of London, on October 14.

WILLIAM EARL DODGE SCOTT, curator of the department of ornithology of Princeton University, has died at the age of fifty-eight years.

CHARLES BARTON HILL, formerly connected with the Lick Observatory and the U. S. Coast and Geodetic Survey, died at San Francisco on August 25, at the age of forty-seven years.

DR. ROBERT AMORY, a Boston physician, at one time lecturer on physiology at Harvard Medical School, and professor of physiology at Bowdoin College, died on August 27, at the age of fifty-eight years.

DR. PAUL MANTEGAZZA, the eminent Italian anthropologist, died on August 28, at the age of seventy-nine years.

THE New York State Civil Service Commission will hold an examination on September 24, to fill the position of clinical patholo-

gist in the Cancer Laboratory at Buffalo, at a salary of $2,500 a year.

The Pasteur Institute of Paris has received a large bequest from Mme. Catherine Schumacher.

The eastern branch of the American Society of Zoologists will meet during Convocation Week at Ithaca, New York.

The medical tour organized by the German Central Committee this year will start from Stuttgart on September 1, and visit Ragaz, Flims, Davos, Vulpera, Tarasp, St. Moritz, Zuoz, Pontresina, Sils-Maria, Lugano, Montreux, Caux, Glion, Leysin, Evian, Interlaken and Bern, ending at Freiburg in Baden on September 19.

The Second Quinquennial International Congress of Anatomists was held at Brussels from August 7 to 11. The London *Times* states that the meetings were held in the morning in the university, and in the afternoon demonstrations were given in the Anatomy School in the Parc Leopold. There was also an official reception by the Municipality in the Hôtel de Ville, besides the customary dinner of the members. Some fifty papers were read, the great majority of them dealing with embryology, both human and comparative, and histology. Such subjects as the development of the blood cells, their classification and terminology, and the earliest stages of development of the fertilized ovum in man, in marsupials, and in the rodents of North America were fully treated by Minot, of Boston; Hill, of London; Lee, of Minneapolis; Lams, of France; Maximow and Frau Dantschakoff, of Germany, and others. An international committee was appointed to consider and draw up a uniform nomenclature in embryology.

The Royal Sanitary Institute preliminary program of the Twenty-fifth Congress, to be held in Brighton from September 5 to 10, is abstracted in the London *Times*. The president of the congress is Sir John Cockburn. Dr. A. Newsholme (principal medical officer, local government board) will deliver the lecture to the congress on "The National Importance of Child Mortality," and Dr. Alex. Hill will deliver the popular lecture on "The Bricks with which the Body is Built." A large number of local authorities have already appointed delegates to the congress, and as there are also over 3,800 members and associates in the institute there will probably be a large attendance, in addition to the local members of the congress. A health exhibition of apparatus and appliances relating to health and domestic use will be held as illustrating the application and carrying out of the principles and methods discussed at the meetings; it not only serves this purpose, but also an important one in diffusing sanitary knowledge among a large class who do not attend the other meetings of the congress. The congress will include general addresses and lectures, and two section meetings, for two days each, dealing with: Section I.—Sanitary Science and Preventive Medicine. President, Professor E. W. Hope, medical officer of health, city and port of Liverpool. Section II.—Engineering and Architecture. President, Mr. Henry Rofe. There will be eight special conferences, namely: "Municipal Representatives," "Port Sanitary Authorities," "Medical Officers of Health," "Engineers and Surveyors to County and other Sanitary Authorities," "Veterinary Inspectors," "Sanitary Inspectors," "Women on Hygiene," presided over by Lady Chichester, and "Hygiene of Childhood," presided over by Sir William Collins, M.P.

The British registrar-general has issued his return relating to the births and deaths in the second quarter of the year, and to the marriages in the three months ending March last. As abstracted in the *British Medical Journal*, the marriage-rate during that period was equal to 12.6 per 1,000, or 1.4 per 1,000 more than the average rate for the corresponding quarter of the ten preceding years. The 234,814 births registered in England and Wales during the quarter ending June last were equal to an annual rate of 26.0 per 1,000 of the population, estimated at 36,169,150 persons in the middle of the year; the birth-rate last quarter was 2.1 per 1,000 below the average for the second

quarter of the ten preceding years, and was lower than the rate for the corresponding period of any year since civil registration was established. Among the several counties the birth-rates ranged from 19.3 in Carnarvonshire, 20.0 in Sussex, 21.0 in Kent, 21.1 in Devonshire, 21.6 in Northamptonshire and 21.7 in Cornwall, to 30.0 in Nottinghamshire, 30.1 in the North Riding of Yorkshire, 32.6 in Carmarthenshire, 34.0 in Durham, 35.7 in Glamorganshire and 37.4 in Monmouthshire. In seventy-seven of the largest towns, including London, the birth-rate averaged 26.1 per 1,000, and ranged from 14.2 in Hornsey and Hastings, 18.4 in Bournemouth, 19.1 in Halifax and 19.5 in Handsworth (Staffs) and in Bradford, to 34.3 in Coventry, 34.4 in Tynemouth, 34.6 in Swansea, 35.9 in St. Helens and 41.0 in Rhondda; in London the birth-rate was 24.9 per 1,000. The births registered in England and Wales during the quarter under notice exceeded the deaths by 119,112, the excess in the corresponding period of the three preceding years having been 111,198, 122,782 and 111,998, respectively. From a return issued by the board of trade it appears that the passenger movement between the United Kingdom and places outside Europe resulted in a net balance outward of 42,920 English passengers, 868 Welsh, 20,854 Scottish, 11,708 Irish and 18,202 of foreign nationality, whilst there was a net balance inward of 5,461 British colonial passengers. During the second quarter of the year the deaths of 115,702 persons were registered, equal to an annual rate of 12.8 per 1,000, or 2.3 per 1,000 lower than the average rate in the ten preceding second quarters; the death-rate last quarter, like the birth-rate, is the lowest ever recorded for that period of the year. Among the several counties the death-rates ranged from 9.7 in Essex, 9.8 in Middlesex, 10.6 in Leicestershire, 10.9 in Kent and in Northamptonshire and 11.0 in Worcestershire to 15.1 in Carnarvonshire, 15.2 in Cumberland, 15.6 in Monmouthshire, 18.2 in Carmarthenshire and 18.3 in Denbigshire. In seventy-seven of the largest towns the death-rate averaged 12.6 per 1,000; in London it was 11.6 per 1,000, while among the other towns it ranged from 7.4 in Hornsey, 7.5 in King's Norton and 7.7 in Walthamstow and in Handsworth (Staffs) to 16.1 in Stockport, 16.2 in Manchester, 17.7 in Liverpool, 17.8 in Oldham and 20.6 in Merthyr Tydfil. The mortality among persons aged 1 to 60 years was at the rate of 6.5 per 1,000 of the population estimated to be living at those ages, and was 1.4 per 1,000 below the average rate in the corresponding period of the ten preceding years. Among persons aged 60 years and upwards the death-rate in the quarter under notice was 61.5 per 1,000 or 4.3 per 1,000 less than the average in the ten preceding second quarters.

UNIVERSITY AND EDUCATIONAL NEWS

THE national memorial to Grover Cleveland is to take the form of a tower to be erected at Princeton as part of the buildings of the graduate school, with which Mr. Cleveland was closely identified during the last years of his life. The tower will be about 150 feet high and 40 feet square. It will cost $100,000, of which sum $75,000 have already been given.

MISS B. HENAN has given $50,000 to Cork University for the establishment of scholarships.

DEAN E. W. STANTON, of the Iowa State College, has been appointed acting-president of the institution.

MR. EDWARD J. KUNZE has been appointed assistant professor of mechanical engineering at the Michigan Agricultural College.

DR. NORMAN A. DUBOIS, of the department of chemistry of the Case School of Applied Science, has been elected professor of chemistry in the School of Pharmacy of Western Reserve University.

DR. OTTO FRITZSCHE, chief engineer of the Krupp works in Essen, has accepted the chair of mechanics in the Freiburg Mining School.

DR. LUDWIG KNORR, of Jena, has accepted a call to Würzburg, as successor to Professor J. Tafel.

DISCUSSION AND CORRESPONDENCE

THE REFORM OF THE CALENDAR

To the Editor of Science: The brief article in the July 29 number of Science by Professor Reininghaus on reform of the calendar is opportune, and it is hoped that action will soon be taken for the appointment of an international committee who will give us a calendar well shorn of the many disadvantages of the present one.

In the year 1899 Moses B. Cotsworth, of York, England, had in type the main propositions for, and in 1902 he published in full, "The Rational Almanac" in a narrow octavo volume of 471 pages. This is an interesting and worthy book. In brief, its propositions are as follows:

Without disturbing the commonly accepted Gregorian Calendar or lengths of years, the advantages of the proposed permanent almanac could be realized by three simple steps, viz:

1. From Christmas Day, 1916, cease naming this day by any week-day name, and merely call it Christmas Day, which could thus be set apart as the extra Sunday to permanently combine the week-end holiday with Christmas, thus getting rid of the troublesome and unbusiness-like changing of week-day names for dates throughout future years. By naming Leap-year Day Leap Day, and as a public holiday without any week-day name, justice would be done to salaried servants, whilst maintaining fixed day names for each date.

2. Let Easter, Whitsuntide and other movable festivals be fixed (as Christmas is) to always fall on the fixed dates to be arranged for the year 1916 that will best suit the convenience, welfare and pleasure of the people. Easter could thus be permanently fixed in May as one of our longest open-air public holidays.

3. Divide the fifty-two weeks of the year into thirteen months of four weeks each, by inserting a mid-summer month to be called Sol.

Please give us an editorial on this subject, and the desirability of an international committee.

Charles E. Slocum

Defiance, Ohio

OCCURRENCE OF MISTLETOE (PHORADENDRON FLAVESCENS) ON PRUNUS SIMONI

The writer recently found a number of Simoni plums at Newcastle, Cal., seriously parasitized by the yellow mistletoe, *Phoradendron flavescens* Nutt., which had infested the bodies and framework of these trees in much the same way as it is known to attack the buckeye (*Æsculus californica*). It was found that the mistletoe reproduced vegetatively, the haustoria spreading in the bark and giving rise, by buds, to numerous plants which produced a very twiggy appearance.

It is probable that the parasitism of this species of mistletoe on *Prunus simoni* has been previously reported, but the writer has not seen any reference to it.

P. J. O'Gara

U. S. Department of Agriculture

SCIENTIFIC BOOKS

The Volcanoes of Kilauea and Mauna Loa on the Island of Hawaii; their variously recorded history to the present time. By William T. Brigham, A.M., Sc.D. (Columbia). From the Memoirs of the Bernice Pauahi Bishop Museum, Vol. II., No. 4, 4to, pp. vii + 222, 143 illustrations in the text; pls. XL.–LXVII. Honolulu, H. I., Bishop Museum Press. 1909.

In 1866 Mr. Brigham published in the quarto memoirs of the Boston Society of Natural History, Vol. I., parts 3 and 4, "Notes on the Volcanoes of the Hawaiian Islands," and in 1869 in the same memoirs, "Notes on the Eruption of the Hawaiian Volcanoes, 1868," amounting to 156 pages, 5 plates and 50 wood cuts. The present volume is a reprint of the "Notes" with certain omissions, emendations and additions, continuing the history to 1909, based upon original observations and the opinions of various visitors, written in the record books of the Volcano House. It is defined as a "connected story of the activities of the Hawaiian volcanoes in historic times" as free

as possible from tentative theorizing. "A collection of material for other geologists to use in elucidating, as far as it may serve, those deeper problems often touched upon but as yet unsolved—the source of volcanic heat, the cause of the rise and outflow or ejection of the matter usually classed as volcanic—on these geology has no positive knowledge." A very few pages are descriptive of the general characters of the lavas, including stalactites and stalagmites. Among the few analyses reprinted are some from the Wilkes report, which Dana took special pains to repudiate. The principal topics touched upon in the "Notes" and omitted in the later volume are the sketches of the geology of the other islands of the archipelago, theoretical formation of the Hawaiian group, lava as a formative agent, the formation of pit-craters, erosion, the place of the Hawaiian volcanoes in volcanic systems, theories of volcanic action, the minerals of Hawaii and a chronological list of the known eruptions.

The failure to present a chronological list of the eruptions for each volcano seriously diminishes the value of the history, especially as the accounts of Mauna Loa are not separated from those of Kilauea, as was done in the "Notes." It is impossible to learn whether the activities of 1849, 1855 and 1879 in Kilauea were to be regarded as true eruptions, and an opinion on this point would be a great help. We are left, therefore, to estimate the value of the several disconnected statements, each by itself.

The general history of Kilauea is simple. Melted lava accumulates in the lower pit, rises gradually till the highest level that can be supported is attained. Then there is a collapse, the liquid disappears, whether to flow out of an opening on the flank of the mountain, or to sink into the earth, sometimes being discharged at the bottom of the sea. After that the process of accumulation recommences. Since 1820 there have been fifteen of these collapses or breakdowns, of which the most spectacular was manifested in 1894. The lava lake attained the height of 3,755 feet above the sea, or 282 feet below the Volcano House, with an area of 13.37 acres, and occupied the summit of the ascensive column, being kept in place by the cooled edges, presenting the appearance of an inverted saucer. This was the supreme moment in the history of the caldera and should have been commented upon. Instead of this, Dr. Brigham copied the error of Mr. F. S. Dodge, affirming the altitude to have been 207 feet greater than its actual level. Only a glance at the figure is needed (p. 186) to discover that the datum line of 282 feet was put in the wrong place, and the slip is comparable with a misprint in correcting proof. Mr. Dodge has corrected the misstatement in the record book, but not before it had been quoted by Dr. Brigham, L. A. Thurston, S. E. Bishop, W. H. Pickering and others. It is to be presumed that no one will be more annoyed than the author himself when he discovers the error, and the importance of having the exact figure stated for the highest known lake of fire in Kilauea.

The information about the eruption of 1832 from Kilauea is obtained from Rev. J. Goodrich. An abstract of his statement is presented between quotation marks, and Mr. Goodrich is thus made responsible for the use of two words which he did not employ. The first is *Kilauea iki* and the second is *Halemaumau.* When quoted in 1865 the term Poli o Keawe was employed instead of Kilauea iki. Even if some should think it justifiable to put quotation marks upon an abstract, where is the propriety of quoting one geographical term in 1865 and replacing it by another in 1909?

The illustrations of the book are its particular feature. These have been carefully selected and well printed. One hundred and forty-three are printed with the text and vary in size. Many of these relate to the early history, are correctly copied from the original drawings or engravings, and can be usefully employed in making restorations of the true dimensions. Twenty-eight illustrations are of full size in the book, measuring 9.5 by 12 inches. The chef d'œuvre is the frontispiece, Halemaumau in 1880, presented in bright colors after a painting by C. Furneaux.

The value of these plates would have been much greater if they could have been arranged in chronological order and properly labeled. Twelve of the plates have no date upon them and even an expert can not be sure to what period in the history some of them belong. Plate LXIV. is said to represent the source of the flow of 1880–81; but it was taken from near the head of the flow of 1887.

In utilizing the records of these volcanoes attention must be paid to the personal equation. Because the events happened so long since we hardly consider the relations of the two early explorers, Admiral Wilkes and Professor Dana. The former wished to write the history himself and hence directed that the latter should attend to business elsewhere, although he was the official geologist of the expedition. With a keen sense of the injustice done him, Dana would not fail to mention the weak points in the writing of his superior. Wilkes had Vesuvius in mind, evidently, when he spoke of the action as "a sea of molten lava, rolling to and fro its fiery surge and flaming billows." Dana saw only a feeble but constant agitation, like that of a caldron in ebullition, whence came his classification of volcanoes erupting violently and peacefully. The ascription of the Hawaiian volcanoes exclusively to the quiet class originated in his criticism of Wilkes; and he was himself forced to admit later that the eruption of 1790 was truly explosive, such as had not been observed since, and consequently that both styles of discharge may be manifested in the same volcano.

An apparent neglect of Dana's work appears in Captain Dutton's report. Naturally the former felt slighted and failed to acknowledge some important suggestions of the latter, such as the use of the term caldera for those volcanoes in which the quiet action predominates. I happen to know that this apparent neglect arose entirely from the inconvenience of obtaining for reference a copy of the geology of the exploring expedition.

Dr. Brigham illustrates the personal equation in his selection of observers whose statements meet his approval. Dutton is not quoted because the reader can consult his report. From Dr. Titus Coan much material is obtained, though he rightly rejects the theory that the lava streams from Kilauea and Mauna Loa united to cause the Kau earthquakes and the Kahuku eruption of 1868. Miss Bird's descriptions are accepted only because they agree with those of W. L. Green. He is indifferent to Miss Gordon Cumming who acknowledges her indebtedness to him in her "Fire Fountains." There are no allusions to H. B. Guppy, W. H. Pickering and A. B. Lyons.

Every one will approve of Dr. Brigham's recommendation that a permanent scientific observatory be established at Kilauea where notes may be taken with the best instruments, of earthquakes, the diurnal changes of level of the dome of Halemaumau, the temperatures of the molten lava and steam jets, the analysis of the ejecta and spectroscopic observations. No organization can more fittingly attempt such an establishment than the trustees of the Bishop Estate, who sustain the museum of which Dr. Brigham is director.

C. H. Hitchcock

Die Polarwelt und ihre Nachbarländer. Von Otto Nordenskjöld. Mit 77 Abbildungen im Text und einem Farbigen Titelbild. Leipzig und Berlin, Druck und Verlag von B. G. Teubner. 1909.

Most books about the polar regions are either accounts of explorations, histories of discoveries, or scientific monographs. This recent work of Dr. Nordenskjöld falls into neither of these categories. It is rather a physical geography, describing in a general way the chief characteristics of the polar and semi-polar regions, especial emphasis being laid on glacialogy and climatology. It has, however, a personal quality rare in such works, because Dr. Nordenskjöld has traveled and explored both in the Arctic and the Antarctic, and his comparisons and descriptions are therefore often those of an eye-witness of the phenomena he speaks of, and not merely facts culled from the works of other writers. "Die

Polarwelt" is a book which will well repay close study by all glaciologists and polar travelers, and it is to be hoped that Dr. Nordenskjöld will enlarge it in another edition, as it is full of fresh thoughts and valuable comparisons, in many cases only too briefly expressed.

Dr. Nordenskjöld begins with a study of Greenland, a portion of the eastern shores of which he has himself explored. Although little is known of the interior, yet this seems to be almost entirely covered with an inland ice cap, some two million square kilometers in extent. In the south the ice cap reaches the sea only in a few places, but where this takes place in the fiords, the ice advances with great velocity. In the north the ice cap, as along Melville Bay, extends along the shore as an ice wall. In former years the glaciation was much more extensive than now, as its traces are found on all exposed spots. On the eastern coast of Greenland north of Scoresby Sound is a district of about 5,000 square kilometers, called Jameson Land, which was explored by Nordenskjöld himself. It is a stony, sandy and mossy plateau, on which there is no ice cap nor any glaciers. And as a result, polar life is specially abundant, and troops of musk oxen, countless lemmings, and an occasional wolf were seen. A good part of Greenland seems to be formed of gneiss, and to-day there is no trace of volcanic activity. But in some places, especially in the east, basaltic lava has broken through and overflowed the gneiss, and it seems probable that these lavas belong to the same formation as those in Iceland, the Faroes, Scotland and Ireland and that at one time Greenland was joined to Europe. The most noteworthy attribute of the climate is that it changes with extreme rapidity, in accord with the winds, and when this blows from the land, the temperature rises on the coast. Of the Eskimos, Dr. Nordenskjöld has a high opinion, and he is inclined to think that their main original habitat was in the lands west of Hudson Bay and that they spread from there.

Iceland is the center of a great volcanic area, which extended from Greenland to Ireland, Scotland and the Faroes. This volcanic activity began in the early Tertiary, and has gradually died out, except in Iceland. Jan Mayen Island, for instance, is entirely volcanic and the craters of the mountains show the activity has only stopped recently. Iceland is much smaller than formerly. It may be looked on as a high plateau, contorted by volcanic forces and smoothed down by former glaciation, of which there are many traces. Possibly there were several glacial periods and to-day a portion of Iceland is still under an ice cap. At one time the climate was quite mild; now it is oceanic, relatively warm in winter and cold in summer, stormy, damp and foggy.

Spitzbergen in the main is mountainous, but in places it is almost a level plateau. The mountains are not very high and many fiords cut deeply into the islands. There is much ice and many glaciers, but nothing that can be considered a true ice cap. There is quite an abundant vegetation. And this is a point of difference with Franz Josef Land, an archipelago with many of the characteristics of Spitzbergen, but much more arctic, since while Spitzbergen has 125 varieties of plants, Franz Josef Land has only 14. Coal has been found in Spitzbergen, and mining is already well started, and taken in connection with an increasing summer tourist inroad, it seems as if Spitzbergen might become in time a semicivilized region.

Bear Island is interesting as an example of a rather rare geological occurrence. It consists of 400 to 500 meters high land in the south, sloping off gently to the north. It is largely covered with masses of broken stones and dirt, which fall into long streaks or broad lines. While these formations are not definitely explained as yet, it would seem as though the frost and ice broke up the rock in the higher land, and that water and rains then washed it down to the lower levels.

About Antarctica, Dr. Nordenskjöld depends largely on his own observations. He is in doubt whether East Antarctica and West Antarctica form one mass or whether they are separate. He thinks that the coasts running from north to south are much less ice covered

than those stretching east and west. He is unable to explain satisfactorily why it is that at some places, like the South Shetlands, there are huge masses of ice, while at others, like Snow Hill, there are stretches of ground which are ice free. But this last condition may, in some way, be due to the storms. He is also quite unable to account for the various phenomena connected with the ice cap of East Antarctica, as we know nothing about it beyond the few facts obtained by the British expeditions in Victoria Land, and that von Drygalski observed the edge of the ice cap advancing very slowly in Kaiser-Wilhelm Land. Dr. Nordenskjöld considers the ice cap of East Antarctica the greatest geographical problem in the world, and that nothing will be really known about it, until some expedition pushes in some distance from some place on its sea front, such as Wilkes Land. The Great Ice Barrier he looks on as remarkable but not unique, as he himself discovered a similar, if smaller, formation, which he calls "shelf-ice," on the coast of King Oscar Land. He was not able to ascertain whether this had any motion. The mode of formation of this shelf-ice is still uncertain. The ice conditions in the south are decidedly different from those in the north. The great mass of ice rests undoubtedly on land, and the ice caps are much bigger. And this mass of ice Dr. Nordenskjöld thinks is due mainly to the semi-oceanic climate, since Antarctica is surrounded by water, and there is much precipitation. But it is mainly due to the very cold summers: at Snow Hill, for instance, more snow fell in summer than in winter. Antarctic temperatures, however, vary in different places. The climate was not always as cold as now, as fossils have been found, probably of Tertiary times, which belong to a subtropical climate. They link West Antarctica to South America. The penguins already lived in the south in Tertiary times, and have gradually adapted themselves to the changed conditions. There are no land animals whatever in Antarctica, and one reason may be that, at one period, the ice covered absolutely every bit of land, and killed off any life there may have been.

All the lands so far mentioned, barring Iceland, Dr. Nordenskjöld considers true polar, with the ice as their chief characteristic. Those described in the second half of his book he looks on as semi-polar. These have sometimes polar characteristics, but sometimes quite different characteristics. Snow and ice play their part, but mainly in winter; in summer they must be looked for almost wholly in mountainous regions.

Of southern South America, Dr. Nordenskjöld speaks largely from his own explorations. Along the western coast there is the mountain range of the Andes, to the west of which extends a string of islands, with deep navigable channels behind them, and how these were formed, Dr. Nordenskjöld hesitates to say, but he evidently disbelieves that they were scooped out by ice. On the contrary, the fiords and valleys running inland he thinks were at least to some extent formed by glaciers, and he judges that these lands were at one period largely ice capped. Even to-day, in some places, glaciers reach to the sea. On the eastern coast, on the contrary, there is a plateau formation, which gradually slopes from the mountain to the sea. Much of this plateau is covered with masses of broken stone (*geröll*). Dr. Nordenskjöld thinks these may be due to great glacial rivers, which kept changing their courses, accompanied, as in Iceland, with some volcanic action: still he leaves the matter problematical. There are many moraines also, which prove a former great extension of the glaciers, but nothing which shows that there was a true ice cap. Dr. Nordenskjöld, while in Patagonia, heard of a find by some workmen of a skin in a cave. He visited the place and dug out himself a piece of this skin, covered with long reddish hair. It turned out to belong to a *Grypotherium*, a giant sloth of, probably, Pleistocene times, and this discovery led later to others. There are two native tribes in Patagonia: the Onas to the east, the Yaghans to the west, and about these Dr. Nordenskjöld makes an important new suggestion. Usually they are ranked as the lowest of races, because they have not invented clothes. Dr. Nor-

denskjöld says this is incorrect; that one should remember that the climate is no worse than that of Belgium and that real cold is never felt, that parrots and magnolias flourish, and that a guanaco skin cloak is really sufficient protection for a savage under the circumstances. In many other ways, also, the natives show that they have adapted themselves to their environment. Had they been treated as the Eskimos were in Greenland, they would undoubtedly have survived.

Of sub-antarctic islands, Dr. Nordenskjöld does not write from experience. But he calls attention to the fact that Kerguelen Land has the most oceanic climate in the world, in summer about like that of October, in winter about like that of November, in southern Sweden. And he also justly bewails the impending extinction there of the sea-elephant.

Of northern North America and Siberia, Dr. Nordenskjöld says they are quite different in their nature from true polar lands, and the underlying cause is that they are continental masses and therefore have continental climates. Though the winters are very cold, the summers are hot, and these melt the snows and restrict the glaciers to mountain regions.

The northern American archipelago, Baffin Land, Grant Land, etc., has a semi-oceanic climate, and is far north. It is therefore covered with ice in spots, but there is not a true ice cap. There was unquestionably a time when most of arctic North America was glaciated, nevertheless, there are spots where this does not seem to have been the case. For instance, in some parts of the Yukon Valley the shape of the hills, the absence of moraines, and the weathered slopes of the ranges would seem to prove that these places could never have been overlain by glaciers. The surface gold is also a proof, for had a glacier spread over the valley, the gold would have been swept away.

Dr. Nordenskjöld does not know Siberia at first hand. He calls attention to the fact that it is even more continental than North America, and that it has the most continental climate in the world, with very cold winters and hot summers. The latter, and also probably the lack of great mountain ranges, keep Siberia free from an ice cap. Large areas of the ground, however, are frozen solid, and these have yielded mammoths in a state of such good preservation, that we can be certain they were really a polar animal. When the hot summers begin, they loosen first the southern headwaters of the streams, causing fearful floods and ice gorges as the water piles up against the still frozen northerly sections of the mighty rivers. Dr. Nordenskjöld makes some comparisons between the Eskimos and the Siberian natives, showing how these also have adapted themselves to their environment.

Scandinavia is really a high plateau and resembles Labrador. It has an oceanic climate, but with relatively warm summers. Formerly northern Europe was entirely glaciated. Then one stream of ice from Scandinavia and one from Scotland poured into the North Sea and this may have formed shelf-ice not unlike the Great Ice Barrier. The summer climate must at that time have been under 0° C. There must have been cold and mild periods, and sometimes the climate must have been not unlike that of Patagonia, while at other times Scandinavia, with its sharp rock towers standing outside in the ocean, must have resembled the South Shetlands.

At present continental ice caps are found in Greenland and in Antarctica. Ice caps also cover some islands. In the glacial period, true ice caps extended over northern Europe and most of North America, but not over Siberia or Patagonia, where, however, there was heavy glaciation. There is nothing to show that the glacial period was not simultaneous in both hemispheres and the climate was certainly colder than now. For wherever there are ice caps to-day, as in Greenland and Franz Josef Land, there are arctic climates: with a maximum for the whole year of under —5° C., and with very cold summers. The glacial period could not have taken place if the climate had been mild and damp, as can be judged by Kerguelen Land. It can not be proved as yet what caused the lowering of the temperature, but the hypothesis of Arrhenius, that there was less carbonic acid (*kohlensäuregehaltes*) in the air, has some probability.

EDWIN SWIFT BALCH

SCIENTIFIC JOURNALS AND ARTICLES

The July number (volume 11, number 3) of the *Transactions of the American Mathematical Society* contains the following papers:

Eduard Study: "Die natürlichen Gleichungen der analytischen Curven im Euklidischen Raume."

J. W. Young: "Two-dimensional chains and the associated collineations."

L. I. Neikirk: "Groups of rational transformations in a general field."

P. F. Smith: "On osculating element-bands associated with loci of surface-elements."

G. A. Bliss and Max Mason: "Fields of extremals in space."

G. A. Miller: "Groups generated by two operators s_1, s_2 satisfying the equation $s_1s_2^2 = s_2s_1^2$."

L. P. Eisenhart: "Congruences of the elliptic type."

The July number (volume 16, number 10) of the *Bulletin of the American Mathematical Society* contains: "A theorem on the analytic extension of power series," by W. B. Ford; "Extensions of two theorems due to Cauchy," by G. A. Miller; "Existence theorems for certain unsymmetric kernels," by Anna J. Pell; Review of Baker's Multiply Periodic Functions, by J. I. Hutchinson; Review of Bôcher's Higher Algebra (English and German editions), by Arthur Ranum; Review of Coolidge's Non-Euclidean Geometry, by Joseph Lipke; Review of Wieleitner's Spezielle Ebene Kurven, by E. G. Bill; Shorter Notices: Borel-Stäckel's Elemente der Mathematik, Band II.: Geometrie, by C. H. Sisam; Carus's Foundations of Mathematics, by F. W. Owens; Cox's Mechanics, by W. H. Jackson; Abraham's Theorie der Elektrizitat, volume 2, Elektromagnetische Theorie der Strahlung, second edition, by E. B. Wilson; "Notes"; "New Publications"; "Nineteenth Annual List of Papers read before the Society and subsequently published"; Index of volume.

SPECIAL ARTICLES

THE COMPOSITION OF SOME MINNESOTA ROCKS AND MINERALS

The writer after spending two summers in the field for the Geological and Natural History Survey of Minnesota, has been analyzing and gathering data regarding the composition of typical materials, and some interesting variations. The detail of field observations, the petrographic descriptions and the less important types are reserved for future possible bulletins of the survey, but three lines of investigation have given results of general interest: (1) analyses of typical acid and basic igneous rocks, (2) mineral analyses, (3) tests for copper in the Keweenawan lavas.

1. Rock analyses are available from central and eastern Minnesota.[1] In the central area excellent building and monumental stone is obtained from two or three types of granite, which occur in laccoliths of considerable size, in Kewatin schists, and are probably themselves of that age. There are a few masses of gabbro, and the granites are intersected by many diabase dikes and a smaller number of quartz-diabase and quartz-porphyry dikes. In the eastern area are the basic Keweenawan lavas, continuous with the copper-bearing rocks of Michigan. Most of the lavas in Minnesota can be classed in three types of diabase, which show quite distinct field appearance and are mineralogically three points in a series, varying from a mottled rock high in augite to one with conchoidal fracture low in augite, the other constituents showing minor changes.

The attempt has been made to produce analyses of much greater completeness and somewhat greater accuracy than those heretofore available, so as to estimate the approximate composition of the fundamental magma existent in this petrographic province. Broadly considered, these two districts are the southwestern extreme of a long series of outcrops of igneous material extending northeast to Labrador and northwest to McKenzie. They are thus near the point of a great V. The Wisconsin igneous rocks may be assigned a similar position farther east. South and west, some few igneous materials outcrop on the Minnesota River, but then there is a break to the Ozark Mountains and the Black Hills. Northward the outcrops are much more abundant.

[1] Previous work is mostly referred to in the state survey reports.

Of the several dozen analyses made in this study, it has been possible to select those of Table I as representing extensive types and it is desirable to have them on record. Attention may be called to certain peculiarities in these rocks as compared with world averages. The calcium is uniformly high compared with magnesia. In the average Minnesota rock soda is predominant over potash, but there are some decided exceptions to this. A similar discussion of Wisconsin igneous rocks, south of the Keweenawan area, by Weidman[2] shows essentially the same peculiarities, even more extreme. Present data are rather insufficient to yield a serviceable estimate of the average igneous rock for the whole state. In the chem-

TABLE I

Rock Analyses and Averages. (*By F. F. Grout.*)

	1	2	3	4	5	6	7
SiO	72.41	64.40	68.87	48.88	48.27	53.16	48.95
Al_2O_3	14.33	14.93	14.93	16.39	16.29	15.12	16.92
Fe_2O_3	1.09	1.63	1.70	5.51	4.55	5.95	6.35
FeO	1.47	3.13	2.41	7.21	10.09	6.75	5.74
MgO	0.30	3.05	1.25	5.80	4.94	4.76	5.42
CaO	1.66	4.18	3.00	9.11	8.42	5.74	7.70
Na_2O	5.14	3.31	3.52	2.08	2.14	2.38	2.71
K_2O	3.45	3.95	3.06	0.47	0.77	1.54	1.15
H_2O-	0.02	0.07	0.05	0.19	0.64	0.38	0.65
H_2O+	0.08	0.15	0.64	2.15	1.67	1.92	2.70
CO_2	0.21	0.18	0.11	0.09	0.05	0.05	0.20
TiO_2	0.23	0.57	0.58	1.84	2.46	1.68	1.68
ZrO_2	trace	0.07	0.03	none	none	none	0.01
P_2O_5	0.23	0.57	0.29	0.10	0.14	0.09	0.14
S	none	0.12	0.09	0.05	0.04	0.04	0.03
Cr_2O_3	none	trace	0.04	none	none	none	0.03
CuO	none	none	none	0.02	0.03	0.02	0.02
MnO	0.03	0.09	0.09	0.15	0.17	0.17	0.19
SrO	none	none	none	none	none	none	trace
BaO	none	0.05	0.06	0.02	0.04	0.02	0.02
	100.65	100.45	100.72	100.06	100.70	99.77	100.61
Specific Gravity	2.640	2.680		2.974	2.986	2.882	
Name	Toscanose	Harzose	Lassenose (Toscanose)	Hessose	Auvergnose	Bandose	Hessose

1. Typical red granite of central Minnesota. T. 124 N., R. 28 W. Contains quartz, soda-orthoclase and microcline, a little oligoclase, biotite and hornblende, and accessory magnetite, apatite and sphene. Augite has been found as cores in the hornblende.

2. Typical gray granodiorite of central Minnesota. T. 124 N., R. 28 W. Contains quartz, oligoclase, orthoclase, microcline, augite and hornblende with accessory ilmenite, magnetite, apatite, sphene and zircon. Hornblende and in some cases biotite develop from augite. Much of the quartz and feldspar is secondary and enlarged original crystals.

3. Approximate average composition of Minnesota granites from all available analyses. (17 new analyses included.)

4. Mottled diabase, Keweenawan of Taylors Falls. T. 34 N., R. 19 W. Contains altered augite and plagioclase with ophitic texture; olivine and magnetite. The alteration gives much chlorite and epidote.

5. Hackly diabase, Keweenawan of Snake River. T. 39 N., R. 21 W. Similar to the preceding number, with less augite, thus leaving the texture diabasic.

6. Conchoidally fracturing diabase, Keweenawan of Crooked Creek. T. 42 N., R. 18 W. Similar to No. 5, with so little augite that the texture is granular.

7. Estimate of the average composition of Keweenawan lavas from all analyses available from the Lake Superior Region. (15 new Minnesota analyses.)

[2] Wisconsin Survey, Bulletin XVI.

TABLE II

Mineral Analyses. (All material air-dried.)

	1	2	3	4	5	6	7
SiO_2	61.69	66.62	47.25	63.37	55.76	36.50	51.34
Al_2O_3	19.46	22.20	31.56	21.08	23.24		22.48
Fe_2O_3	1.89	trace		0.36	0.97	3.58	0.72
FeO		none	2.29				
MgO	0.52	0.77	0.29	trace	0.55	1.25	0.97
CaO	none	1.40	15.39	1.72	trace	33.28	10.68
Na_2O	0.20	8.82	2.52	9.32	11.79	none	1.23
K_2O	15.00	0.37	0.37	4.04	0.07	0.10	0.40
H_2O-	0.10	—	—	—	0.10	0.16	1.66
H_2O+	0.97	—	0.40	0.57	8.06	5.95	10.14
Other	TiO_2=0.10 CO_2=0.15				CO_2=0.15	B_2O_3=18.88 *est.* CO_2= 0.20 TiO_2= 0.10	CO_2=0.10
Total	100.08	100.18	100.07	100.46	100.68	100.00	99.72
Sp. G.	2.615	2.645			2.283	2.951	2.353

	8	9	10	11	12	13	14
SiO_2	49.66	53.73	53.02	62.78	31.87	31.84	44.60
Al_2O_3	21.15	15.08	20.55	15.52	17.58	18.32	6.93
Fe_2O_3	1.55	4.24	1.94	2.28	7.63	2.59	9.59
FeO		2.36	1.36		8.67	13.80	3.94
MgO	1.44	9.12	7.31	3.19	20.81	20.64	19.98
CaO	9.16	0.08	0.08	none	trace	none	0.74
Na_2O	1.49	0.38	0.72	none	none	trace	0.61
K_2O	1.38	8.02	6.20	5.82	0.92	trace	0.15
H_2O-	2.90	1.02	1.82	6.23	0.47	1.80	8.00
H_2O+	10.80	5.55	5.36	4.50	11.63	10.40	5.00
Other	CO_2=0.12	TiO_2=0.03		TiO_2=0.06	TiO_2=0.15	CO_2=0.13	CO_2=0.13 TiO_2=0.06
Total	99.65	99.61	98.36	100.39	99.73	99.52	99.73
Sp. G.	2.315	2.750	2.677	2.581	2.777	2.739	2.500

1. Orthoclase. Small light brown tufts (resembling stilbite in form) lining amygdaloidal cavities. T. 39 N., R. 21 W. Analysis by F. F. Grout.

2. Albite. Separated by specific gravity from an albite-epidote rock. T. 126 N., R. 35 W. Analysis by F. F. Grout.

3. Anorthite. Beaver Bay, north shore of Lake Superior. Analysis by C. P. Berkey.

4. Soda-microcline phenocrysts in red granite. T. 123 N., R. 29 W. Analysis by L. Pease and F. H. Keller.

5. Analcite. Trapezonedral crystals (211), colorless to red in amygdaloidal cavities. T. 39 N., R. 21 W. Analysis by F. F. Grout.

6. Datolite. New occurrence for Minnesota except in glacial drift. Enamel-like bunches occurring like No. 1 and No. 5 above. T. 39 N., R. 21 W. Analysis by F. F. Grout. A rough determination of boric acid gave 17.36.

7. Laumontite. Light pink amygdules. T. 39 N., R. 21 W. Analysis by F. F. Grout.

8. Laumontite. Dark red vein filling. T. 39 N., R. 21 W. Analysis by F. F. Grout.

9. Pseudomorph after No. 8, especially near calcite contacts. Analysis by F. F. Grout.

10. A further alteration of No. 8, to white soapy earth with loss of the original form and structure. Analysis by F. F. Grout. Average of four analyses with uniformly low summation.

11. An earthy product resembling No. 10 occurring with chlorite No. 12 on Upper Tamarack Creek. T. 42 N., R. 16 W. Analysis by F. F. Grout.

12. Chlorite from the same rock as No. 11. Analysis by F. F. Grout.

13. Chlorite amygdules. T. 39 N., R. 21 W. Analysis by F. F. Grout.

14. Chlorite (or green earth) vein. T. 42 N., R. 18 W. Analysis by F. F. Grout.

The high hygroscopic moisture is recovered on standing in ordinary air.

ical classification, a Hessose and the closely related Bandose and Auvergnose are the most widely represented types.

2. The table of mineral analyses shows the degree of purity of the material found and needs little explanation. Several of the occurrences are here recorded for the first time, notably the datolite. Laumontite furnished material for a crystallographic study now in progress. The angles observed between the simple prisms and oblique terminations are too far from those recorded to be easily explained by the impurity of the mineral. Further, an alteration of laumontite is found clearly formed at a dump of a new deep shaft on Snake River. Coarse red laumontite grades into light earthy green, especially along contacts of two crystals or the coating of calcite which is common on laumontite. Well-developed pseudomorphs occur, retaining the peculiar angles mentioned for the original. A study of occurrence on the dump, indicated that further alteration yielded a much lighter green soapy to earthy product. Thin sections show a confused aggregate, even in the pseudomorphs, none of the particles reaching one hundredth of a millimeter in length, and none showing a high interference color. The analyses show that these are no simple minerals, but they represent a remarkable substitution in the laumontite. Lime is completely removed, as is part of the water, while potassium and magnesium increase. The variability in similar material in other outcrops is also shown. Tests are in progress to determine its homogeneity if possible. It is proposed to call it pseudo-laumontite. A mottled diabase, altered very green, gave further evidence of the prevalence of alteration to some mineral or mixture high in potash and magnesia. Unless this soft aggregate contains orthoclase, the alteration is not previously recorded for laumontite. The solubility in sulphuric acid makes orthoclase quite impossible. Dana mentions alteration by "magnesian solutions." Van Hise[3] and Clarke[4] in discussing the alteration of rock minerals mention no such products, but Pumpelly[5] speaks of a replacement of many zeolites by chlorite, and a pseudomorph of "clay (?) after laumontite" which probably refer to similar material as it is common throughout the Keweenawan. Neither chlorite nor clay is an accurate name.

3. A study of the prospective copper deposits of the southwestern extreme of the Keweenawan rocks led to a test of the country rock for traces of copper. The common theory of origin of the Lake Superior copper deposits is that of lateral secretion from the diabases, but both ascending and descending solutions have been credited as supplying part or all of the copper. Direct evidence has not been found in the literature, except a reference to a few grains of sulphids in the fresh diabase. The present tests are reasonably conclusive. Copper does occur in all the main types of rock, and as far as can be judged from ten samples, *the fresher the rock the larger the amount of copper.* The type of rock shows less effect on the proportion of copper than the alteration. An olivine rock, high in the series on Snake River, with hardly alteration enough to yield chlorite, gave a maximum, 0.029 per cent., and the altered rocks a minimum, 0.012 per cent. Blank analyses were made and all due precautions observed. A test of the compound in which copper exists gives signs of an insoluble silicate, probably augite. Only one tenth of the copper was soluble in nitric acid in the rocks tested. A calculation shows that a concentration of copper from 500 parts of rock to one part of ore must have occurred to produce the known ores from such rock. Such a concentration, though extreme, is by no means impossible.

FRANK F. GROUT

UNIVERSITY OF MINNESOTA,
January, 1910

[3] U. S. Geological Survey, Monograph 47.

[4] U. S. Geological Survey, Bulletin 330.

[5] Michigan Geological Survey, Vol. I., Pt. II., p. 45.

THE TOADS OF THE NORTHEASTERN UNITED STATES

SINCE the publication of the "Frog Book" by Miss Mary C. Dickerson, in 1906, consid-

erable interest has been aroused in the toads of the eastern United States. Mr. A. H. Allard, in two articles in SCIENCE, September 20, 1907, and November 6, 1908, has shown that, instead of being a very local race, as was supposed until quite recently, Fowler's toad is a widely distributed species found from northern Georgia to southern New England. During the past four summers the writers have been collecting and studying toads in the state of New Jersey and neighboring regions, and now feel able to make some statement as to the range of *Bufo americanus* and *B. fowleri* in that area.

At the outset of our investigations it was found that only one species, readily identified as Fowler's toad, occurred about our homes at Plainfield, N. J., and Staten Island, N. Y., as well as in the pine barrens of southern New Jersey. Later *Bufo americanus* was taken in Sullivan Co., N. Y., and afterwards by Mr. W. T. Davis in the mountains of northern New Jersey, where we have since found both Fowler's toad and the "American" toad living together, as they do in southern New England.

The characters which distinguish the two species are more apparent in living than in preserved examples, and are subject to considerable variation. The best difference is the relative wartiness of the skin, *Bufo americanus* being very much rougher, having much larger and more prominent warts on its dorsal surface, and especially on the hind legs, than *Bufo fowleri*. The presence or absence of spots on the breast is not an absolutely reliable guide, for we have found occasional specimens of Fowler's toads with a few faint spots, in addition to the usual median mark between the throat and breast; and examples of the American toad, with immaculate underparts are not uncommon. The general color of the belly of *B. fowleri* is grayish white, while that of *B. americanus* is a much buffier shade. The back of the former is ordinarily grayish, and that of the latter greenish or brown, often yellowish-olive or reddish. The American toad seems to attain a greater size than Fowler's toad, the head and body of a female specimen collected by Mr. Dwight Franklin in Pike County, Pa., measuring 10 centimeters in length. The iris of *Bufo americanus* is bronze in color, and that of *B. fowleri* silvery. It is our opinion that live Fowler toads have a much stronger odor, like that of ailanthus wood, than do American toads.

In the "Frog Book" Miss Dickerson states that *Bufo fowleri* has longer and slenderer legs. Our measurements show no appreciable average difference in the length of the legs, so that the apparent shortness of the American toads' legs is evidently due to their greater fleshiness, and more extensive webs.

While we do not agree with Mr. Allard in calling the song of Fowler's toad a "scream" or "wail," it certainly has much less music to it than the trill of the American toad. The notes are more closely connected, so that a sort of buzzing is produced.

The range of Fowler's toad has already been outlined by Mr. Allard as extending from New England to northern Georgia. It is found throughout the whole state of New Jersey, except possibly in the extreme northwest corner. South and east, it replaces *B. americanus* entirely, so that throughout southern and central New Jersey, as well as on Staten Island, there is only one kind of toad. All the toads we have been able to procure on Long Island have also belonged to the southern species, so that the American toad is probably not found there.

Bufo americanus is found together with *B. fowleri* in the mountainous portion of the state, and down the Palisades of the Hudson at least as far as Grantwood, opposite the upper part of Manhattan Island. We have a considerable series of examples collected at Newton, Newfoundland, Budd's Lake, Englewood and Grantwood. This toad is also found in numbers at Van Cortlandt Park, in the Borough of the Bronx, New York City, but we have found no typical examples, as yet, on Manhattan Island. Like many other northern animals, it extends its range down the Alleghenies, as is shown by two specimens sent to

us from Garret County, Maryland. In northern New Jersey, where both species of toad occur, the American toad is conspicuous only during the breeding season. In midsummer almost all the toads that are found hopping along the roadside at dusk are Fowler's toads. This apparent scarcity of the northern toad may be due to its habits; it may stay more in the woods, or come out later at night.

At Newton, N. J., in mid-June, a number of fine specimens of *americanus* were found in the long grass of a moist meadow bordering a cat-tail marsh, associated with pickerel and leopard frogs. No individuals of *fowleri* were found in the meadow, all, with one exception, being seen along the roads in the evening, where also a few examples of *americanus* were taken.

The difference in the time of breeding of the toads is well known. On Staten Island the song of Fowler's toad is first heard about April 20, when the American toads at Van Cortlandt Park, N. Y., have already begun to leave the water.

Bufo americanus and *B. fowleri* are certainly to be looked upon as distinct species rather than as geographical races, yet we have taken a number of toads on the Palisades, and on the northern end of Manhattan Island, which we can not refer satisfactorily to either. Most of them are intermediate in regard to the size of the warts, and a few are as smooth as Fowler's toads but with black spots on the breast. They may represent only the extremes of variation, or they may perhaps be hybrids. This is a question which could be settled only by experimental study, but that there is some possibility of hybridization is shown by the following incident: A male American toad, during the spring of 1909, which was put in a cage with some frogs, was later found clasping a female pickerel frog (*Rana palustris*) to which he clung for several days. Would not such an individual, if unsuccessful in securing a mate of his own species, be quite likely, a little later, to fertilize the eggs of a female Fowler's toad?

W. DEW. MILLER,
JAMES CHAPIN

FURTHER PROOFS OF THE INCREASE IN PERMEABILITY OF THE SEA URCHIN'S EGG TO ELECTROLYTES AT THE BEGINNING OF DEVELOPMENT

USING Kohlrausch's method, I observed an increase in electric conductivity of the sea urchin's egg at the beginning of development, indicating an increase in permeability to ions. Although only one proof is necessary to establish a fact, it is interesting to see other data fall into line.

If an electric current is passed through the egg of *Arbacia punctulata,* the cytoplasm begins first to disintegrate in the region nearest the anode. The red pigment diffuses out of the plastids in this region and turns an orange hue.[1] This is most probably due to the accumulation of anions, which dissociate water, forming acids, and indicates a poor permeability of the plasma membrane to anions. As no corresponding disintegration takes place at the cathode end, the plasma membrane must be more permeable to cations than to anions.

If fertilized and unfertilized eggs in sugar solution be placed on the same slide under the microscope and an electric current of gradually increasing strength passed through, the unfertilized eggs begin to disintegrate sooner than do the fertilized eggs. This difference is also true after the fertilization membrane has been shaken off. Therefore, the unfertilized eggs are less permeable to anions than are the fertilized eggs.[2] A low permeability to anions means a low permeability to electrolytes, since the cations on leaving the egg would be pulled back by the negative field produced by the excess of anions confined, and only the undissociated molecules could diffuse freely.

Since it has been shown that unfertilized eggs are less permeable to anions than are fertilized eggs, we should expect it to be more difficult to plasmolyze unfertilized than fertilized eggs with solutions of non-electrolytes. In solutions of non-electrolytes, the electro-

[1] A solution of the pigment turns pale orange in acid and deep purple and is precipitated in alkali.

[2] Or the electrolytes have diffused out of the fertilized more than from the unfertilized eggs, in either case showing increased permeability.

lytes would diffuse out of fertilized eggs, thus lowering the internal osmotic pressure to a greater extent than from unfertilized eggs. This would make the ratio of external to internal osmotic pressure greater in the former than in the latter case.

In testing this prediction by experiment, urea solutions were found to be so toxic as to interfere with the observations. Sugar solutions, however, gave the expected results. If fertilized and unfertilized eggs be placed in a molecular solution of cane or invert sugar (approximately isosmotic with sea water) and observed under the microscope, the fertilized eggs appear small and sometimes irregular in outline, whereas the unfertilized eggs appear normal. This difference is observed before the formation of the "hyaline plasma layer" in the fertilized eggs, so their shrinking is real, *i. e.*, not due to a receding of the granules toward the interior.

I made series of measurements of the diameters of eggs treated in this manner, of which the following are specimens:

One drop of a molecular solution of dextrose contained eggs of the following measurements: unfertilized, 85, 84, 81, 84, 82, 84, 85, 85, 80, 85, 83, 85, 83, 85, 84, 83, 82, 86, 83 (mean = 83); fertilized, 80, 85, 80, 80, 75, 74, 70, 66, 67, 66, 80, 67, 78, 80, 80, 69, 70, 68, 80, 77 (mean = 75). As a control, a drop of sea water containing fertilized and unfertilized eggs was investigated and recorded as follows: unfertilized, 88, 85, 82, 90, 90, 82, 75, 82, 75, 85 (mean = 83); fertilized, 83, 80, 83, 90, 90, 82, 93, 82, 95, 80, 92 (mean = 86).

It thus appears that whereas in sea water fertilized eggs are not smaller than unfertilized, in a molecular solution of sugar fertilized eggs are plasmolyzed faster than are unfertilized eggs, indicating greater permeability of the fertilized eggs to electrolytes, or of the unfertilized eggs to sugar. As the former alternative agrees with previous data above mentioned, we assume it to be the correct one.

We thus have three demonstrations of the increase in permeability of the egg to electrolytes at the beginning of development: (1) the decrease in electrical resistance, (2) the less rapid disintegration of the anode region and (3) the increased plasmolysis.

The second demonstration, if found true in other cases, would account also for the difference in electrical potential between the interior and exterior of the living cell, and the negative variation in nerve and muscle. The anions (of any electrolyte in greater concentration in the interior than on the exterior) that are prevented from escaping would make the interior negative in relation to the exterior; and a surface area of increased permeability would be negative in relation to the remainder of the surface. A band of increased permeability causing increased surface tension around the equator of the dividing egg would account for the constriction of the first cleavage furrow.

J. F. McClendon
U. S. Bureau of Fisheries,
Woods Hole, Mass.,
August 8, 1910

SAN FRANCISCO MEETING OF THE AMERICAN CHEMICAL SOCIETY

The meeting of the American Chemical Society in San Francisco and the sightseeing and entertainments enjoyed there and en route will always be remembered by those who attended as one of the pleasantest memories of their lives.

The members taking the special train, some 110 in number, gathered at the La Salle Hotel in Chicago on July 4, where they were entertained at luncheon as the guests of the Chicago Section.

The special train, furnished by the Santa Fe Road, was composed of the Pullman Company's finest equipment, electric-lighted throughout, with observation, library and buffet cars.

The first stop was made at Colorado Springs, where most of the members took the trip to Pikes Peak and to the Garden of the Gods, while others contented themselves with the attractions around Manitou and the Cheyenne Canyon.

On the following morning the train stopped for a short period at Albuquerque and reached Adamana at one o'clock, where carriages and wagons were in waiting to take the party to the Petrified Forest, some twelve miles distant. Although the sun shone brightly, no inconvenience was experienced, owing to the altitude and the dryness of the atmosphere, and all were repaid by the wonders awaiting them.

Friday, July 8, was passed at the Grand Canyon, without question the greatest of all nature's marvels. Rides were enjoyed by many along the rim, while a number went on mule back or on foot to the bottom of the canyon, a mile below.

The following afternoon, July 9, was spent driving around Redlands and automobiling through the orchards and palm-grown avenues of Riverside. The party had already been met at the Grand Canyon by Mr. Ralph A. Gould, chairman of the local committee, welcoming them to the state of California on the part of the California Section, and just before reaching Riverside a committee of chemists from Los Angeles met the train and outlined the entertainment to be given by the Los Angeles chemists on the following day.

July 10 was spent in and around Los Angeles as guests of the local chemists, visiting Pasadena, the San Gabriel Mission and Long Beach, and dinner was served at a pleasant resort on the seashore. In the evening the visiting members were entertained with a reception and dinner at the Sierra Madre Club and retired at a late hour to the special train, awaking in the morning at Lang, California. Here the party became the guests of the Sterling Borax Company, visiting their mines on a special train provided for the purpose, and each member received an interesting souvenir of the trip.

That afternoon and evening were spent at Santa Barbara, where a carriage drive was taken and the Santa Barbara Mission visited.

Early the next morning as the party approached Salinas the greatest excitement of the whole trip was furnished by the wrecking of the special train, which ran off the track in rounding a curve, completely destroying the engine and three cars. Fortunately none of the party was seriously hurt, although those in the forward part of the train were severely shaken up. After about three hours' delay the party proceeded to San José, where they were met by many members of the California Section and were entertained at lunch at the Vendome Hotel. Leaving here for San Francisco, the train was found full of bouquets of sweet peas and baskets of fruit presented to the ladies of the party by the San José Chamber of Commerce.

At six o'clock, July 12, the party arrived in San Francisco, and from that time on the hospitality of the California Section was boundless. Every detail had been attended to by the local committee. Each member was immediately taken to a taxicab, carried to his hotel, and special vans were waiting for the baggage, which, without any attention on the part of the visiting members, was soon found awaiting them in their rooms. On arrival at the hotel, the ladies of the party found bouquets of roses awaiting them.

On Wednesday morning, July 14, the forty-second general meeting was called to order by President Bancroft in the St. Francis Hotel. After an address of welcome by Arthur Lachman for the California Section, responded to by President Bancroft, the following addresses were delivered in general session:

W. D. Bancroft, "Positive Photography" (illustrated with lantern slides).

Edw. C. Franklin, "Liquid Ammonia as a Solvent and the Ammonia System of Acids, Bases and Salts."

W. F. Hillebrand, "Chemistry in the Bureau of Standards."

H. E. Barnard, "The Use of Sodium Benzoate as a Preservative of Food."

At the same time a ladies' reception was held in the parlors of the St. Francis Hotel.

After luncheon the members present and their guests enjoyed an excursion over the Ocean Shore Railroad to Half Moon Bay and Tunitas Glen, returning in time for the smoker held in the Fairmont Hotel and for the ladies' theater party. A hot supper had been promised at the smoker and all who partook of the tamales and heard the Chinese music were ready to acknowledge that the adjective was quite descriptive.

On Thursday morning the meetings of the divisions were held in the St. Francis Hotel and many interesting papers were presented. The symposium on smelter smoke before the industrial division excited especial interest.

After luncheon all attending the meeting enjoyed one of the pleasantest excursions of the trip, made by special train to the top of Mt. Tamalpais, stopping at the Muir Woods. The members were entertained at a banquet during the evening on the top of the mountain. Several of the members remained all night, coming down the mountain on the following morning in gravity cars. The Muir redwoods, named after John Muir, is probably one of the most beautiful bits of scenery in the immediate vicinity of San Francisco, and the ride to the top of the mountain, with the changing interest of foliage and panorama of hill, valley, bay and distant city of San Francisco, was appreciated by all.

Friday morning was spent at the University of

California in Berkeley, mainly in an examination of the various buildings, laboratories and campus of this beautifully-situated institution.

Friday noon the party boarded a special steamer as the guests of the Selby Smelting and Lead Company, and sailed some twenty miles up San Francisco Bay, being entertained at luncheon by the company and afterwards conducted through their plant, where the various processes of lead smelting and the recovery of gold and silver therefrom were explained. One of the chief attractions of this plant was the opportunity given to view the new Cottrell precipitating apparatus installed for the purpose of removing sulfur trioxide and any other solids or liquids present in smelter smoke.

After returning to San Francisco, the evening was spent in a visit to Chinatown, where at ten o'clock all were entertained at a Chinese collation of tea and sweets served in a Chinese restaurant to music which the local committee characterized as sweet.

Saturday morning was devoted to divisional meetings at which the remaining papers on the program were read.

In the afternoon at two o'clock the members were treated to an automobile ride over Buena Vista Heights, through the Golden Gate Park to the ocean beach and the Cliff House, returning through the Presidio and the residential section of San Francisco.

In the evening the members assembled for the main banquet of the week in the St. Francis Hotel, at which the ladies attending were guests. About two hundred and fifty sat down to the banquet, which will long be remembered by those present.

On July 17 the party, as the guests of the Italian-Swiss Colony, took a special train to Asti, where an unusually pleasant day was enjoyed in examining the vineyards and wineries of this well-known region. Lunch was served outdoors in unusually attractive pergolas. The party returned to San Francisco early in the evening and were given, almost for the first time, opportunity to sleep.

On the following morning, July 18, an excursion was taken by steamer up the Sacramento River to Sacramento through the wonderfully fertile fields of the Sacramento Valley, between levees so high that the party was obliged to view the country from the upper deck of the steamer. The general aspect was much like that of portions of Holland. Returning from Sacramento by train, the party reached San Francisco late in the evening, having been royally entertained. Many, however, took trains at Sacramento for the north.

On Tuesday, July 19, a special steamer was provided for those who remained to visit and examine the various points of interest around San Francisco Bay.

Following the meeting in San Francisco, the members returned to their homes by various routes, but some thirty traveled northward by invitation of the Puget Sound Section to visit Seattle and obtain a view of the northern Pacific coast scenery. Arriving in Seattle on the morning of the twenty-first, the party was met by President Falkenburg, of the Puget Sound Section, Horace G. Byers, councilor of the section, President Kane, of Washington University, and others, who welcomed them as the guests of the Puget Sound Section.

On arrival the ladies were supplied with bouquets of dahlias and shortly afterwards all started on an automobile trip which covered all parts of the city, both business and residential, and included the beautiful grounds of Washington University.

At the end of the drive the party were lunched at the Commercial Club, after which they immediately left on a chartered steamer for a trip around Puget Sound. The first stopping-point was the plant of the Pacific Creosoting Company, where the party left the boat and inspected the largest creosoting plant in the world. Returning, a stop was made at the navy yard, where battleships and armored cruisers were examined, and then the party proceeded to Tacoma, where a delightful lunch was served under the enormous trees of the Tacoma City Park. By the courtesy of the board of park commissioners, the party was well supplied with roses and given permission to pick all the sweet peas they could carry away.

From Seattle some came east via Vancouver and the Canadian Rockies, while others came over the Northern Pacific, visiting the Yellowstone National Park.

Unusual enthusiasm was shown throughout the whole meeting and many new western members were added to the society, which now has a membership of over five thousand.

Two hundred and ninety members and guests registered for the meeting.

One hundred and twenty papers were presented at the meeting, embodying new chemical research, many of them reporting very important results.

Charles L. Parsons,
Secretary